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IN COOPERATION WITH THE KOOTENAI NATIONAL FOREST, U.S.D.A.

FISHERIES DIVISION

Completion Report

TROUT HABITAT SUITABILITY QUANTIFICATION STUDY

By

Bruce May, Bob Rainville and Joe Huston

December 1979

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MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION

Job Completion Report

State: Montana

Title: Trout Habitat Suitability Quantification Study

Project No: 3156

Period Covered: July 30, 1979 to November 30, 1979

ABSTRACT

The Kootenai Forest Habitat Suitability System produced ratings which had only weak correlations with trout populations. The rating system was found to be too subjective and did not include several important parameters which influence trout populations, such as annual stream flow variation, minimum flows and water velocity. Recommendations are presented which would make the Kootenai System sufficiently quantitative to produce ratings which would be indicative of trout populations.

INTRODUCTION

The Kootenai National Forest has developed a trout habitat suitability rating system to assist in its land use planning and project decision-making processes. A study was needed to determine if trout populations were correlated with the suitability ratings calculated for resident and rearing fish and aquatic insect habitats. The choice of physical factors to be analyzed is difficult because environmental variables in streams are typically correlated and confounded with each other (Reid, 1961). Later studies have substantiated Reid's ideas on multivariant control of fish populations. Numerous physical, chemical and biological factors interact to provide a given fish population size. The most important abiotic factors for fluvial fish habitats are temperature, rate of water flow, fluctuation in discharge and cover availability (Hynes, 1972). A recent study by Binns and Eiserman (1979) concluded that annual stream flow variation, late summer flows, nitrate concentrations, fish food abundance and diversity, cover, substrate, water velocity and stream width were the most important environmental factors influencing stream trout populations.

METHODS

The habitat suitability rating system developed by fisheries biologists, Hank Newhouse and Bob Rainville of the Kootenai National Forest, was used to rate 14 sections in 7 streams. The streams rated include: 1) Big Creek, 2) Sunday Creek, 3) Callahan Creek, 4) O'Brien Creek, 5) Pete Creek, 6) East Fork of Yaak River and 7) Rock Creek. The Kootenai rating system evaluates the

following parameters as either good, fair, poor or none: 1) instream cover, 2) bank cover, 3) spawning habitat and 4) channel stability (Appendix 1). Substrate composition is determined from ocular examination of the stream bottom. Pools are classified using the parameters of depth, length and cover (Duff and Cooper, 1976). Estimates were made of the percent of the stream in pools, riffles, run and glide. The width and depth were determined for a pool and riffle from each section. Ocular estimates of flow and water velocity were made. Instantaneous water temperatures were taken and the gradients were determined with aid of a clinometer.

The relative abundance of major aquatic insect orders was estimated by counting insects from approximately three square feet of rocks taken from a riffle area. An aquatic insect index was determined from the following parameters: total alkalinities, organic debris, algae growths, substrate size, bottom stability, percent of stream in riffle and embeddedness.

Fish were collected using standard Montana electrofishing gear. Mark and recapture data were used to calculate population estimates on 14 one thousand foot-long sections. Methods described by Vincent (1971) were followed for electrofishing operations and for analyzing mark and recapture data. Approximately 48 hours elapsed between the marking and recapture runs. The estimates tend to run high due to the movement of marked fish from the section between the marking and recapture runs. The error should be similar among the sections. Length frequency distributions and age data from previous years were used to segregate fish into approximate age groups.

FINDINGS

East Fork Yaak River

The habitat suitabilities and population estimates for the East Fork of the Yaak are given in Tables 1 and 2, respectively. Rainbow trout (Salmo gairdneri) was the primary fish species collected from the two sections. A few rainbow X cutthroat hybrids were also caught. A total of 151 and 351 rainbow trout were caught in Sections 35 and 25, respectively. The resident suitabilities were markedly higher in Section 35 than in Section 25, yet the population estimated indicated a slightly higher population of rainbow over 7.0" in Section 25 than 35. The lower resident populations in Section 25 than in Section 35 were probably related to the differences in stream flows and widths between the sections. The flows (about 20 cfs) and width (30 feet) in Section 25 were about twice as large as those in Section 35. Binns and Eiserman (ibid.) found that stream width and late summer stream flows were important factors influencing trout densities. The aquatic insect suitabilities in both sections were the highest recorded, yet the standing crop estimates ranked only 4th and 5th out of 12 sections. Silt deposition and the lack of class 1 and 2 pools in the upper 500 feet were adversely affecting trout production in Section 25. The lack of pool formation and a large annual variation in stream flow and little instream cover appeared to be limiting trout production in Section 35.

Table 1. A summary of the trout and aquatic insect suitabilities in 14 sections from seven streams on the Kootenai National Forest. The population estimates expanded to number of fish per surface acre are given in parenthesis for resident and rearing suitabilities and in weight per surface acre for aquatic insect suitabilities.

Stream	Section	Resident Suitabilities[1/]	Rearing Suitabilities	Aquatic Insect Suitabilities
East Fork Yaak	35	19(70)	27(741)	34(43.7)
East Fork Yaak	25	35(76)	28(976)	34(51.0)
Beetle Creek	2	19(74)	24(653)	18(38.8)
Pete Creek	19	21(19)	27(273)	22(17.1)
Rock Creek	2	24(295)	26(677)	21(105.1)
E.F. Rock Creek	1	19(109)	24(385)	14(49.2)
Big Creek	25	19(19)	34(658)	19(24.9)
S.F. Big Creek	8	20(--)	26(1,749)	18(39.9)
Callahan Creek	20	25(70)	34(709)	19(48.4)
S.F. Callahan Creek	26	25(24)	36(1,099)	15(72.6)
Sunday Creek	18	37(60)	25(608)	21(41.9)
Sunday Creek	6	30(271)	30(1,713)	33(133.0)
O'Brien Creek	32	34(70)	38(400)	25(29.0)
O'Brien Creek	7	28(112)	34(205)	26(43.8)

[1/] The suitability rating system is listed below:

Rating	Points
Very high	34-40
High	28-33
Moderate	22-27
Poor	15-21
Very poor	0-14

Table 2. Population estimates by length groups and approximate age classes for rainbow trout from the East Fork of the Yaak River, August, 1979. The 80% confidence limits are given in parenthesis as percent of point estimate.

Length Group	Assigned Age	Average Length in Inches	Average Weight in Pounds	Percent Age Composition	Per Surface Acre Number	Per Surface Acre Weight
Rainbow trout T37N R30W S35 Bridge on Vinyl Lake Road						
2.6-4.4	1+	3.4	.02	43.0	349	7.0
4.5-6.9	2+	5.3	.06	48.3	392	23.4
7.0-9.2	3+&4+	7.8	.19	8.7	70	13.3
Total					811 (±24.2)	43.7
Rainbow trout T37N R31W S25 0.2 miles upstream from road to Mac						
3.0-4.9	1+	3.8	.02	64.5	679	13.6
5.0-6.9	2+	5.9	.08	28.2	297	23.8
7.0-8.8	3+&4+	7.8	.19	7.3	76	13.6
Total					1,052 (±14.1)	51.0

Pete and Beetle Creeks

Seventy-three brook trout (Salvelinus fontinalis), 2 rainbow trout, 13 westslope cutthroat trout (Salmo clarki leusi) and 1 mountain whitefish (Prosopium williamsoni) were collected from Pete Creek. Slimy sculpins (Cottus cognatus) and longnose dace (Rhinichthys cataractae) were abundant. The brook trout estimate appears to be too high as a result of the small sample size and only seven recaptures. The suitabilities were similar between the two sections, yet Beetle Creek (Table 3) estimates were markedly higher than the Pete Creek estimates. Part of this discrepancy is due to the high brook trout estimate for Beetle Creek. The annual stream flow variation appeared higher in Pete Creek than in Beetle Creek. Beetle Creek comprised the majority of the flow of Pete Creek at the time of sampling. The water velocities were noticeably lower in the larger Pete Creek channel than in Beetle Creek. Instream cover was much more abundant in Beetle Creek than in Pete Creek. A lack of pool development, large annual stream flow variation, low summer and fall flows, low alkalinities and low insect production were negative influences affecting trout production in Pete Creek. Steep gradient, lack of pools, low alkalinity and low insect production appeared to be limiting trout production in Beetle Creek.

Table 3. Population estimates by length groups and approximate age classes for trout from Pete Creek and Beetle Creek, August, 1979. The 80% confidence limits are given in parenthesis as percent of the point estimate.

Length Group	Assigned Age	Average Length in Inches	Average Weight in Pounds	Percent Age Composition	Per Surface Acre Number		Weight
Brook trout - Pete Creek - T36N R32W S19 (First culvert on Rd. 338)							
3.4- 6.9	1+	4.7	.04	93.4	273		10.9
7.0-11.5	2+&3+	9.2	.32	6.6	19		6.2
Total					292	(±19.1)	17.1
Brook trout - Beetle Creek - T36N R33W S2 (Lower culvert on Rd. 338)							
3.5- 6.9	1+	4.3	.03	80.7	309		9.3
7.0- 8.7	2+&3+	7.7	.19	19.3	74		14.1
Subtotal					383	(±37.7)	23.4
Cutthroat trout - Beetle Creek - T36N R33W S2							
2.7- 4.9	1+	3.9	.02	59.0	203		4.1
5.0- 7.0	2+&3+	5.8	.08	41.0	141		11.3
Subtotal					344		15.4
Total					727	(±25.1)	38.8

Rock Creek

One hundred westslope cutthroat trout and 12 Dolly Varden (Salvelinus malma) were collected from the East Fork of Rock Creek. One hundred and thirty-four westslope cutthroat trout, 124 brook trout and 3 Dolly Varden were collected from Section 2. The data from Rock Creek was not used in calculating the relationship between suitabilities and trout populations, because the estimates appeared quite high (Table 4). Mark and recapture runs were made on consecutive days resulting in a low recapture rate of marked fish. Section 2 did contain an excellent population of resident westslope cutthroat ranging in size from 7.0 - 11.4 inches in total length. The resident suitability, however, was in the moderate class. Low summer flows, high annual stream flow variation and low alkalinities were limiting trout production in section 2. The high gradient, low alkalinities and lack of pool development were limiting trout populations in section 1.

Table 4. Population estimates by length groups and approximate age classes for trout from Rock Creek, September, 1979. The 80% confidence limits are given in parenthesis as percent of point estimate.

Length Group	Assigned Age	Average Length in Inches	Average Weight in Pounds	Percent Age Composition	Per Surface Acre Number		Weight
		Cutthroat trout lower section T32N R26W S2 (0.3 miles below first bridge on road 150)					
3.0- 4.9	1+	4.0	.03	37.3	231		6.9
5.0- 6.9	2+	6.2	.10	29.1	181		18.1
7.0-11.4	3+&4+	8.9	.27	33 6	209		56.4
Subtotal					621	(±30.5)	81.4
		Brook trout lower section T32N R26W S2					
4.3- 6.9	1+&2+	5.4	.06	85.3	265		15.9
7.0- 8.5	2+&3+	7.5	.17	14.7	46		7.8
Subtotal					311	(±34.8)	23.7
Total					932		105.1
		Cutthroat trout East Fork section T26N R32W S1 (Bridge on Rd. 150A)					
3.6- 4.9	1+	4.1	.03	22.6	112		3.4
5.0- 6.9	2+	6.1	.10	55.4	273		27.3
7.0- 8.5	3+&4+	7.6	.17	22.0	109		18.5
Total					494	(±24.8)	49.2

Big Creek

Trout in Big Creek were tentatively classified as a rainbow X cutthroat complex, due to hybridization that has occurred between the two species. Two hundred and thirty-six hybrids and 6 longnose dace were collected from section 25 and 341 hybrids were collected from section 8. The resident suitabilities were poor for both sections and resident populations were low in section 25 (Table 5) and absent from section 8. Rearing suitabilities were very high in section 25 and moderate in section 8, yet the population of fish under 7.0 inches was 2.6 times higher in 8 than 25. Aquatic vegetation was much more abundant in 8 than 25 and the channel stability in 8 was much higher than in

25. Binns and Eiserman (ibid.) found that aquatic vegetation and bank stability were important factors influencing trout populations. Juvenile fish incur much higher mortality rates in unstable streams during the annual spring flood than in stable streams. Aquatic insect suitabilities were poor in both sections and the standing crop of fish in section 25 and 8 ranked 11th and 9th, respectively, out of 12 sections. A high annual stream flow variation, low summer flows and low alkalinities were limiting resident and rearing populations. A lack of class 1 and 2 pools was limiting resident populations along with little cover used by larger fish such as undercut banks and overhanging brush in pools.

Table 5. Population estimates by length groups and approximate age classes for trout from Big Creek, August, 1979. The 80% confidence limits are given in parenthesis as percent of point estimate.

Length Group	Assigned Age	Average Length in Inches	Average Weight in Pounds	Percent Age Composition	Per Surface Acre Number	Per Surface Acre Weight
Rainbow X Cutthroat Complex - Big Creek - T35N R30W S25 (1.2 miles upstream from Steep Creek Rd.)						
3.0-4.4	1+	3.8	.02	66.5	450	9.0
4.5-6.9	2+	5.3	.06	30.7	208	12.5
7.0-8.7	3+&4+	7.7	.18	2.8	19	3.4
Total					677 (±24.5)	24.9
Rainbow X Cutthroat Complex - South Fork Big Creek - T33N R30W S8 (1.6 miles upstream of Garden Ridge Rd.)						
2.4-4.1	1+	3.1	.02	84.8	1,484	29.4
4.2-6.6	2+&3+	4.8	.04	15.2	265	10.5
Total					1,749 (±18.7)	39.9

Callahan Creek

A total of 158 rainbow trout and 14 Dolly Varden were collected from section 20 as compared to 278 rainbow and 45 Dolly Varden in the South Fork (section 26). Resident suitabilities were moderate for both sections. Resident populations in section 26 were about 60 percent higher than in section 20 (Table 6). Rearing suitabilities were very high in both sections and population estimates for 26 and 20 ranked 3rd and 7th, respectively. Instream cover, primarily large substrate, was higher in section 26 than 20 and was instrumental in providing more rearing habitat. Aquatic insect suitabilities

were poor in both sections but standing crop estimates were high with section 26 ranking second. High annual stream flow variation, low summer flows and low alkalinities were limiting production of resident and juvenile populations, whereas lack of class 1 and 2 pools was limiting resident trout production.

Table 6. Population estimates by length groups and approximate age classes for trout from Callahan Creek, August, 1979. The 80% confidence limits are given in parenthesis as percent of point estimate.

Length Group	Assigned Age	Average Length in Inches	Average Weight in Pounds	Percent Age Composition	Per Surface Acre Number	Weight
Rainbow trout lower section T31N R34W S20 (Gate to Big Eight Mine)						
3.2- 4.9	1+	4.2	.03	42.3	330	9.9
5.0- 6.9	2+	5.7	.07	48.7	379	26.6
7.0- 8.6	3+&4+	7.5	.17	9.0	70	11.9
Total					779 (±31.5)	48.4
Rainbow trout South Fork Callahan T31N R34W S26 (Bridge to Goat Creek Road 4554)						
2.9- 4.9	1+	3.8	.02	56.5	603	12.1
5.0- 6.9	2+&3+	5.9	.08	35.2	375	30.1
7.0- 9.3	3+&4+	7.6	.18	8.3	90	16.1
Subtotal					1,068 (±17.2)	58.3
Dolly Varden South Fork Callahan T58N R3E S9						
5.0- 6.9	1+&2+	5.9	.08	83.5	121	9.7
7.0-10.8	3+&4+	7.9	.14	16.5	24	4.6
Subtotal					145 (±24.1)	14.3
Total					1,213	72.6

Sunday Creek

A total of 350 brook trout, 8 cutthroat trout and 3 sculpins were collected from section 18 as compared to 402 brook trout from section 6. The resident

suitabilities ranked very high for section 18 and high for section 6 which had the highest number of resident fish (Table 7). Rearing suitabilities ranked moderate in section 18 and high in section 6 which ranked second in number of residents. Aquatic insect suitabilities ranked high in section 6 which had the highest standing crop of any section sampled. The total alkalinities in Sunday Creek (220 ppm) were the highest recorded in any of the streams sampled, indicating that Sunday was a very productive system. Flows were also quite stable and there appeared to be comparatively little annual fluctuation in stream flow. Large deposits of marl and the resulting embeddedness were limiting aquatic insect production in section 18. Angler harvest is probably reducing the number of brook trout over 6.0 inches. Sunday Creek has the reputation of being a good brook trout stream and receives considerable fishing pressure.

Table 7. Population estimates by length group and approximate age classes for brook trout from Sunday Creek, August, 1979. The 80% confidence limits are given in parenthesis as percent of point estimates.

Length Group	Assigned Age	Average Length in Inches	Average Weight in Pounds	Percent Age Composition	Per Surface Acre Number	Per Surface Acre Weight
Brook trout lower section T33N R24W S18 (Bridge on road 3738)						
3.5- 5.5	1+	4.5	.04	75.3	503	20.1
5.6- 6.9	2+	6.2	.10	15.7	105	10.5
7.0-11.2	3+&4+	7.8	.19	9.0	60	11.3
Total					668 (±14.6)	41.9
Brook trout upper section T32N R25W S6 (Bridge on Road 315)						
3.0- 5.5	1+	4.4	.03	60.9	1,209	36.2
5.6- 6.9	2+	6.1	.09	25.4	504	45.4
7.0-11.2	3+&4+	7.7	.19	13.7	271	51.4
Total					1,984 (±16.3)	133.0

O'Brien Creek

A total of 199 westslope cutthroat trout, 13 rainbow trout, 10 brook trout, 5 Dolly Varden and 3 sculpins were collected from section 32, whereas 66 brook trout, 44 cutthroat and 14 Dolly Varden were taken in section 7 (Table 8). The resident suitabilities were very high in section 32 and high in section 7, but the number of resident fish was markedly higher in 7. The estimate for residents in section 7 appeared to be high as the recapture ratio was less than expected.

Table 8. Population estimates by length groups and approximate age classes for trout from O'Brien Creek, August, 1979. The 80% confidence limits are given in parenthesis as percent of point estimate.

Length Group	Assigned Age	Average Length in Inches	Average Weight in Pounds	Percent Age Composition	Per Surface Acre Number		Per Surface Acre Weight
Cutthroat trout lower section T32N R33W S32 (Road 381 bridge 0.7 mile below Rabbit Creek)							
3.0- 4.9	1+	4.3	.03	72.8	342		10.2
5.0- 6.9	2+	5.6	.07	12.3	58		4.1
7.0-10.8	3+&4+	8.1	.21	14.9	70		14.7
Total					470	(±24.0)	29.0
Cutthroat trout upper section T32N R33W S7 (Road 352 below mouth North Fork)							
3.7- 4.9	1+	4.0	.03	6.4	9		0.3
5.0- 6.9	2+	6.0	.09	24.8	35		3.2
7.0-11.9	3+&4+	9.0	.29	68.8	97		28.1
Subtotal					141	(±23.0)	31.6
Brook trout upper section T32N R33W S7							
4.1- 6.9	1+	5.3	.06	91.5	161		9.7
7.0- 7.9	2+&3+	7.5	.17	8.5	15		2.5
Subtotal					176	(±20.1)	12.2
Total					317		43.8

Rearing suitabilities were very high in both sections, but number of juveniles ranked low when compared to other sections (Table 1). Aquatic insect suitabilities were moderate for both sections. The standing crops of trout ranked 10th and 5th out of 12 sections. The lower than expected number of residents in section 32 may be a result of angler harvest. This section has good access and is only seven miles from Troy.

DISCUSSION

The relationships between resident suitabilities and number and weight estimates are presented in Figure 1. The correlation of coefficient (R) was .36 for both the number and weight estimates, indicating a comparatively weak linear relationship between resident suitability ratings and trout populations. The relationship between rearing suitabilities and trout populations was negative (Figure 2) indicating an inverse relationship between suitabilities and juvenile fish. The rating system does not include annual stream flow variation which was found by Binns and Eiserman (ibid.) to be the most important environmental factor influencing trout populations. Late summer flows, stream width and water velocity were also not included in the Kootenai Rating System. Bank cover (actually floodplain vegetation) has little direct influence on trout populations and should be deleted. The factors influenced by floodplain vegetation: 1) water temperatures, 2) bank stability and 3) instream cover and pools due to log recruitment should be measured separately. Gradient should be deleted from the rating and the factors influenced by gradient (substrate, pool development and aquatic insect abundance) measured directly.

A productivity index is not included in the resident rating system and this helped account for the weak relationship between suitabilities and trout populations. Quantitative measurements of total alkalinity or nitrate nitrogen, aquatic insect abundance and diversity and submerged aquatic vegetation are needed to develop a productivity index.

Fish of different sizes utilize different micro habitats of which cover is an essential element. Therefore, it seems logical to evaluate cover separately for fish over six to seven inches in length and fish under six inches in length. Interstices in the substrate provided most of the cover for small fish in the streams sampled, except for Sunday Creek, whereas undercut banks, log jams, overhanging brush and pool depths provided most of the cover for fish over 7.0 inches in length.

The suitability rating system does not take into account the different habitat preferences of cutthroat trout, rainbow trout, brook trout and Dolly Varden. A modification of the habitat rating system may be required to produce ratings which have high correlations with different trout species.

The correlation coefficients (Figure 3) for the aquatic insect suitabilities versus number of trout (.14) and weight of trout (.36) indicated a weak linear relationship. Food is just one of the environmental factors which influence trout numbers in streams. In most streams, space and cover generally limit trout populations before food (Allen, 1969) and (Chapman, 1966). It follows that aquatic insect populations by themselves often have only weak correlations with standing crops of trout.

The Kootenai Forest aquatic insect suitability rating system appears to have little value in predicting trout populations and should be replaced by a system which quantifies insect populations. Aquatic insects should be collected with a Waters-Knapp type circular sampler, which samples one square

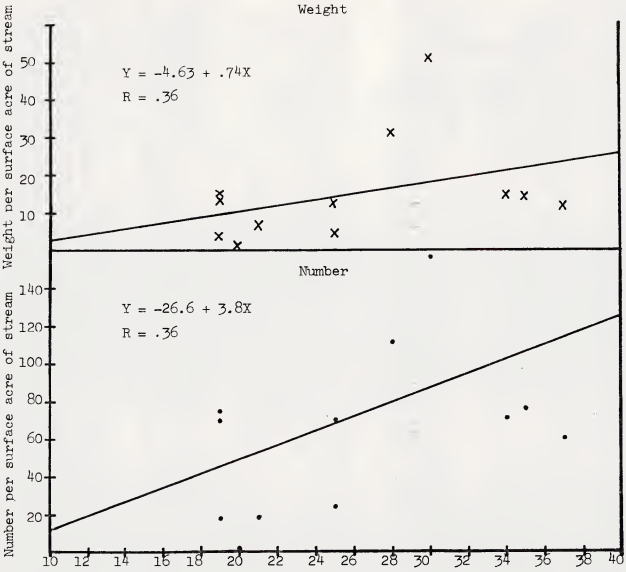

Figure 1. The correlation coefficients (R) and regression lines for resident habitat suitabilities versus numbers and weights of trout over 7.0 inches in total length.

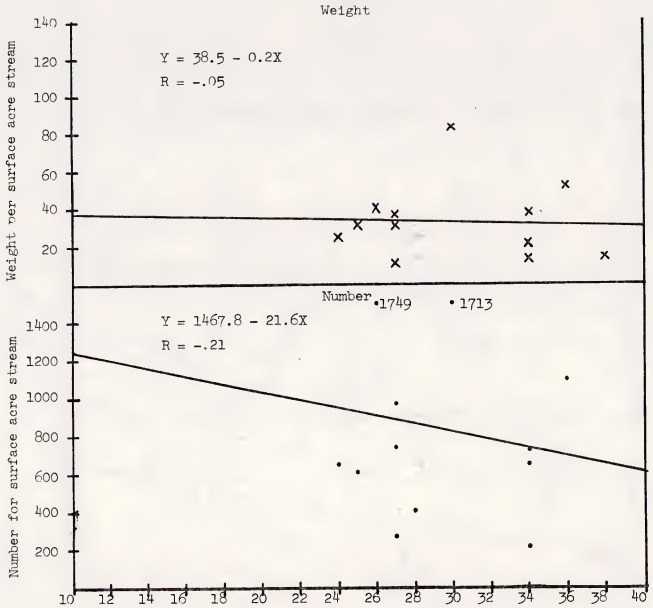

Figure 2. The correlation coefficients (R) and regression lines for rearing habitat suitabilities versus numbers of weights of trout from 3.0 - 6.9 inches in total length.

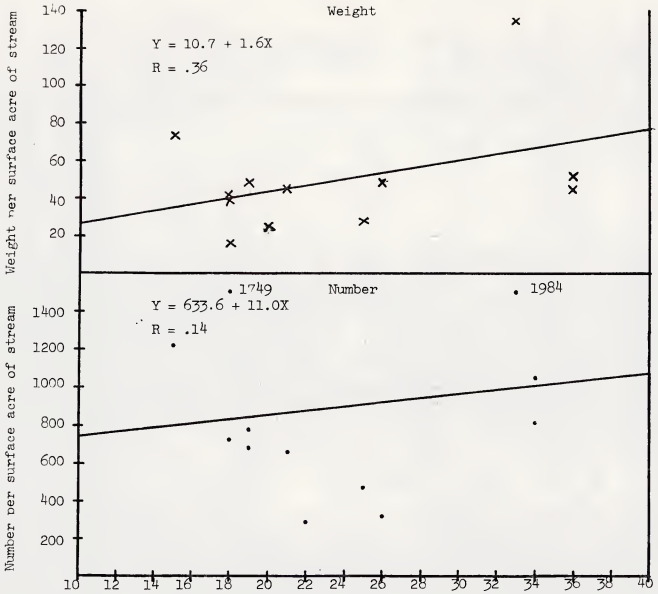

Figure 3. The correlation coefficients (R) and regression lines for aquatic insect suitabilities versus total numbers and weights of trout over 3.0 inches in total length.

foot. The insects can easily be sorted into major taxonomic groups and the populations quantified. People can be trained to separate aquatic insects into orders by trained personnel within a day or two. The aquatic insect data should then be incorporated into the resident and rearing suitability ratings.

An alternative to actual collection of insects is the method utilized by Binns and Eiserman (1979) which involved developing a good index from measurements of: 1) maximum summer water temperatures, 2) nitrate nitrogen, 3) substrate composition and 4) water velocity.

The subjective nature in which the data is collected for the Kootenai Rating System contributes to the unreliable ratings. Actual measurements should be made of the parameters rather than ocular estimates. Although this procedure requires more time, it should produce ratings which have higher correlations with trout populations. Sampling of areas from typical habitat types would reduce the time required for the quantitative survey. The Kootenai System currently in use may be helpful for very general surveys, but it does not produce the precise data required to generate valid suitability ratings.

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Beetle Creek	11032010
Big Creek	11042001
South Fork Big Creek	11622001
Callahan Creek	11086001
South Fork Callahan Creek	No number
East Fork Yaak River	11206001
O'Brien Creek	11482001
Pete Creek	11504001
Rock Creek	05592001
East Fork Rock Creek	05240001
Sunday Creek	07454001

APPENDIX 1

Kootenai National Forest trout habitat suitability ratings for East Fork Yaak River, Beetle Creek, Pete Creek, Rock Creek, Big Creek, Callahan Creek, Sunday Creek and O'Brien Creek.

STREAM NUMBER & NAME: East Fork Yaak STATIONS: 1 DATE: 8/23/79

	WIDTH		DEPTH		VELOCITY	VOLUME
	Present	Full	Present	Full		
Pool	30	50	4.0'	7.0'	0.3 FS	15-20 CFS
Riffle	25	45	0.8'	3.5	1-3 FS	20-25 CFS
Run						

Air: 70°F GRADIENT 1.5-2%

TEMPERATURE Water: 51°F STABILITY RATING 77 TURBIDITY: (Clear) Milky Muddy

% POOL(1, 2 and 3) 10 % RIFFLE 50 % RUN ____ % GLIDE 40%

POOL CLASSES: % CLASS 1: 13 % CLASS 2: ____ % CLASS 3 20 % CLASS 4: 67

BOTTOM MATERIALS:	Very Abundant (> 70%)	Abundant (41 to 70%)	Common (11 to 40%)	Present (< 10%)	None 0
Organic Debris:				5	
Clay/Silt:			10		
Sand:			10		
Fine Gravel (0.1 to 1"):			10		
Coarse Gravel (1 to 3"):			20		
Small Rubble (3 to 6") :			20-30		
Large Rubble (6 to 12"):			20-30		
Boulders (>12"):			10-15		
Bed Rock:					X
AQUATIC VEGETATION:		X			

INSTREAM COVER: Good Fair (Poor) None

Cover Types (Indicate relative importance A > C > P)
Logs P Rocks A Bottom Color mottled
Undercut Banks P Water Color Clear
Choppy Surface A Overhanging Vegetation P

BANK COVER: Good (Fair) Poor None

Major Plant Species: (Indicate relative importance: A > C > P)
Overstory Douglas-fir, spruce, larch
Understory Alder, Mtn. Maple
Surface grasses, thimbleberry,

FISH FOOD ORGANISMS: (>25/ft²) 16-25/ft² 6-15/ft² 1-5/ft²
Food Types: Caddisflies A Mayflies: A Stoneflies: P Diptera P
(Indicate relative abundance A>C>P) Snails: P Leeches: ____
SIZE: S M (L)

SPAWNING HABITAT: Very Good Good Fair (Poor) None

% Gravel	>50%	35-50%	20-34%	10-19%	<10%
Velocity	Must be between 0.5 and 3 FPS				
Depth	Must be between 4 inches and 3 feet				

EMBEDDEDNESS 0 (1/3) 2/3 Full

VALLEY BOTTOM TYPE: (>300 ft.) 100-300 ft. <100 ft.

LAND FORM GRADIENT: (<5%) 5-10% 11-20% 21-30% >30%

LIMITING FACTORS: Pool formation

ADDITIONAL OBSERVATIONS: Much of the stream in glide, few good pools with cover, good juvenile habitat

LAND MARKS: Bridge on Vinal Lake Road
INVESTIGATOR: B. May

* = Estimates

R-1 STREAM CHANNEL STABILITY FIELD EVALUATION FORM

Item Rated	Stability Indicators by Classes							
	EXCELLENT		GOOD		FAIR		POOR	
UPPER BANKS								
Landform Slope	Bank slope gradient <30%	(2)	Bank slope gradient 30-40%	(4)	Bank slope gradient 40-60%	(6)	Bank slope gradient 60% +	(8)
Mass Wasting (Existing or Potential)	No evidence of past or potential for future mass wasting into channels.	(3)	Infrequent and/or very small. Mostly healed over. Low future potential.	(6)	Moderate frequency & size, with some raw spots eroded by water during high flows.	(9)	Frequent or large, causing sediment nearly yearlong OR imminent danger of same.	(12)
Debris Jam Potential (Floatable Objects)	Essentially absent from immediate channel area.	(2)	Present but mostly small twigs and limbs.	(4)	Present, volume and size are both increasing.	(6)	Moderate to heavy amounts, predominantly larger sizes.	(8)
Bank Protection from Vegetation	90% + plant density. Vigor and variety suggests a deep, dense root mass.	(3)	70-90% density. Fewer plant species or lower vigor suggests a less dense or deep root mass.	(6)	50-70% density. Lower vigor and still fewer species form a somewhat shallow and discontinuous root mass.	(9)	<50% density plus fewer species & less vigor indicate poor, discontinuous, and shallow root mass.	(12)
LOWER BANKS								
Channel Capacity	Ample for present plus some increases. Peak flows contained, W/D ratio <7.	(1)	Adequate. Overbank flows rare. Width to Depth (W/D) ratio 8-15.	(2)	Barely contains present peaks. Occasional overbank floods. W/D ratio 15-25.	(3)	Inadequate. Overbank flows common. W/D ratio >25.	(4)
Bank Rock Content	65% + with large, angular boulders 12" + numerous.	(2)	40 to 65%, mostly small boulders to cobble 6-12".	(4)	20 to 40% , with most in the 3-6" diameter class.	(6)	<20% rock fragments of gravel sizes, 1-3" or less.	(8)
Obstructions Flow Deflectors Sediment Traps	Rocks, old logs firmly embedded. Flow pattern of pool & riffles stable without cutting or deposition.	(2)	Some present, causing erosive cross currents and minor pool filling. Obstructions and deflectors newer and less firm.	(4)	Moderately frequent, moderately unstable obstructions & deflectors move with high water causing bank cutting and filling of pools.	(6)	Frequent obstructions and deflectors cause bank erosion yearlong. Sed. traps full, channel migration occuring.	(8)
Cutting	Little or none evident. Infrequent raw banks less than 6" high generally.	(4)	Some, intermittently at outcurves & constrictions. Raw banks may be up to 12".	(8)	Significant. Cuts 12"-24" high. Root mat overhangs and sloughing evident.	(12)	Almost continuous cuts, some over 24" high. Failure of overhangs frequent.	(16)
Deposition	Little or no enlargement of channel or point bars.	(4)	Some new increas in bar formation, most from coarse gravels.	(8)	Moderate deposition of new gravel & coarse sand on old and some new bars.	(12)	Extensive deposits of predominately fine particles. Accelerated bar development.	(16)
BOTTOM								
Rock Angularity	Sharp edges and corners, plane surfaces roughened.	(1)	Rounded corners & edges, surfaces smooth & flat.	(2)	Corners & edges well rounded in two dimensions.	(3)	Well rounded in all dimensions, surfaces smooth.	(4)
Brightness	Surfaces dull, darkened, or stained. Gen. not "bright".	(1)	Mostly dull but may have up to 35% bright surfaces.	(2)	Mixture, 50-50% dull and bright, ± 15%, ie 35-65%.	(3)	Predominately bright, 65% + exposed or scoured surfaces.	(4)
Consolidation or Particle Packing	Assorted sizes tightly packed and/or overlapping.	(2)	Moderately packed with some overlapping.	(4)	Mostly a loose assortment with no apparent overlap.	(6)	No packing evident. Loose assortment, easily moved.	(8)
Bottom Size Distribution % Percent Stable Materials	No change in sizes evident. Stable materials 80-100%.	(4)	Distribution shift slight. Stable materials 50-80%.	(8)	Moderate change in sizes. Stable materials 20-50%.	(12)	Marked distribution change. Stable materials 0-20%.	(16)
Scouring and Deposition	Less than 5% of the bottom affected by scouring and deposition.	(6)	5-30% affected. Scour at constrictions and where grades steeper. Some deposition in pools.	(12)	30-50% affected. Deposits & scour at obstructions, constrictions, and bends. Some filling of pools.	(18)	More than 50% of the bottom in a state of flux or change nearly yearlong.	(24)
Clinging Aquatic Vegetation (Moss & Algae)	Abundant. Growth largely moss like, dark green, perennial, in swift water too.	(1)	Common. Algal forms in low velocity & pool areas. Moss here too and swifter waters.	(2)	Present but spotty, mostly in backwater areas. Seasonal blooms make rocks slick.	(3)	Perennial types scarce or absent. Yellow-green, short term blooms may be present.	(4)
COLUMN TOTALS →	9		64		3			

Add the values in each column for a total reach score here. (E. 9 + G. 64 + F. 3 + F. ___ = 76).

Reach score of: <38=Exellent, 39-76=Good, 77-114=Fair, 115+=Poor.

Form R-1 2500-5 (6-73)

OVER

STREAM NUMBER & NAME: East Fork Yaak STATIONS: _____ DATE: 8/23/79

	WIDTH Present	WIDTH Full	DEPTH Present	DEPTH Full	VELOCITY	VOLUME
Pool	17	24	2	2.0	0.5 FS	8-10 CFS
Riffle	12	18	0.8	2.5	2.0 FS	8-10 CFS
Run						

TEMPERATURE Air: 80 Water: 47°F

GRADIENT _____

STABILITY RATING Fair 97

TURBIDITY: (Clear) Milky Muddy

% POOL (1, 2 and 3) 40 % RIFFLE 60 % RUN - % GLIDE -

POOL CLASSES: % CLASS 1: 20 % CLASS 2: 14 % CLASS 3 30 % CLASS 4: 36

BOTTOM MATERIALS:	Very Abundant (> 70%)	Abundant (41 to 70%)	Common (11 to 40%)	Present (< 10%)	None 0
Organic Debris:			X		
Clay/Silt:			X		
Sand:		X			
Fine Gravel (0.1 to 1"):		X			
Coarse Gravel (1 to 3"):		X			
Small Rubble (3 to 6") :			X		
Large Rubble (6 to 12"):			X		
Boulders (>12"):			X		
Bed Rock:					X
AQUATIC VEGETATION:				X	

INSTREAM COVER: (Good) Fair Poor None

Cover Types (Indicate relative importance A > C > P): Logs A Rocks C Bottom Color mottled; Undercut Banks A Water Color clear; Choppy Surface C Overhanging Vegetation A

BANK COVER: Good (Fair) Poor None

Major Plant Species: (Indicate relative importance: A > C > P)
Overstory Spruce, fir, larch, lodgepole
Understory Alder, dogwood
Surface Grass, cow parsley, bullrush, snowberry,

FISH FOOD ORGANISMS: (>25/ft²) 16-25/ft² 6-15/ft² 1-5/ft²
Food Types: Caddisflies A Mayflies: A Stoneflies: C Diptera C
(Indicate relative abundance A>C>P) Snails: ___ Leeches: _____
SIZE: S (M) L

SPAWNING HABITAT: Very Good Good (30-40) Fair Poor None

% Gravel	>50%	35-50%	20-34%	10-19%	<10%
Velocity Depth	Must be between 0.5 and 3 FPS; Must be between 4 inches and 3 feet				

EMBEDDEDNESS 0 (1/3) 2/3 Full

VALLEY BOTTOM TYPE: (>100 ft.) 100-300 ft. <100 ft.

LAND FORM GRADIENT: (<5%) 5-10% 11-20% 21-30% >30%

LIMITING FACTORS: Class 1&2 pools in upper 500', RB instead of CT, silt possible

ADDITIONAL OBSERVATIONS: Stream is near channel capacity. Has good undercut banks for fish cover, but little slumping.

LAND MARKS: Spring in middle of section 0.2 miles east of turnoff to McIntire Ranch.
INVESTIGATOR: B. May

* = Estimates

R-1 STREAM CHANNEL STABILITY FIELD EVALUATION FORM

Item Rated	Stability Indicators by Classes							
	EXCELLENT		GOOD		FAIR		POOR	
UPPER BANKS								
Landform Slope	Bank slope gradient <30%.	(2)	Bank slope gradient 30-40%.	(4)	Bank slope gradient 40-60%.	(6)	Bank slope gradient 60% +	(8)
Mass Wasting (Existing or Potential)	No evidence of past or potential for future mass wasting into channels.	(3)	Mostly healed over. Low future potential.	(6)	Moderate frequency & size, with some raw spots eroded by water during high flows.	(9)	Frequent or large, causing sediment nearly yearlong OR imminent danger of same.	(12)
Debris Jam Potential (Floatable Objects)	Essentially absent from immediate channel area.	(2)	Present but mostly small twigs and limbs.	(4)	Present, volume and size are both increasing.	(6)	Moderate to heavy amounts, predominantly larger sizes.	(8)
Bank Protection from Vegetation	90% + plant density. Vigor and variety suggests a deep, dense root mass.	(3)	70-90% density. Fewer plant species or lower vigor suggests a less dense or deep root mass.	(6)	50-70% density. Lower vigor and still fewer species form a somewhat shallow and discontinuous root mass.	(9)	<50% density plus fewer species & less vigor indicate poor, discontinuous, and shallow root mass.	(12)
LOWER BANKS								
Channel Capacity	Ample for present plus some increases. Peak flows contained. W/D ratio <7.	(1)	Adequate. Overbank flows rare. Width to Depth (W/D) ratio 8-15.	(2)	Barely contains present peaks. Occasional overbank floods. W/D ratio 15-25.	(3)	Inadequate. Overbank flows common. W/D ratio >25.	(4)
Bank Rock Content	65% + with large, angular boulders 12" + numerous.	(2)	40 to 65%, mostly small boulders to cobble 6-12".	(4)	20 to 40% , with most in the 3-6" diameter class.	(6)	<20% rock fragments of gravel sizes, 1-3" or less.	(8)
Obstructions Flow Deflectors Sediment Traps	Rocks, old logs firmly embedded. Flow pattern of pool & riffles stable without cutting or deposition.	(2)	Some present, causing erosive cross currents and minor pool filling. Obstructions and deflectors newer and less firm.	(4)	Moderately frequent, moderately unstable obstructions & deflectors move with high water causing bank cutting and filling of pools.	(6)	Frequent obstructions and deflectors cause bank erosion yearlong. Sed. traps full, channel migration occuring.	(8)
Cutting	Little or none evident. Infrequent raw banks less than 6" high generally.	(4)	Some, intermittently at outcurves & constrictions. Raw banks may be up to 12".	(8)	Significant. Cuts 12"-24" high. Root mat overhangs and sloughing evident.	(12)	Almost continuous cuts, some over 24" high. Failure of overhangs frequent.	(16)
Deposition	Little or no enlargement of channel or point bars.	(4)	Some new increas in bar formation, most from coarse gravels.	(8)	Moderate deposition of new gravel & coarse sand on old and some new bars.	(12)	Extensive deposits of predominately fine particles. Accelerated bar development.	(16)
BOTTOM								
Rock Angularity	Sharp edges and corners, plane surfaces roughened.	(1)	Rounded corners & edges, surfaces smooth & flat.	(2)	Corners & edges well rounded in two dimensions.	(3)	Well rounded in all dimensions, surfaces smooth.	(4)
Brightness	Surfaces dull, darkened, or stained. Gen. not "bright".	(1)	Mostly dull but may have up to 35% bright surfaces.	(2)	Mixture, 50-50% dull and bright, i 15%, ie 35-65%.	(3)	Predominately bright, 65% +.	(4)
Consolidation or Particle Packing	Assorted sizes tightly packed and/or overlapping.	(2)	Moderately packed with some overlapping.	(4)	Mostly a loose assortment with no apparent overlap.	(6)	No packing evident. Loose assortment, easily moved.	(8)
Bottom Size Distribution & Percent Stable Materials	No change in sizes evident. Stable materials 80-100%.	(4)	Distribution shift slight. Stable materials 50-80%.	(8)	Moderate change in sizes. Stable materials 20-50%.	(12)	Marked distribution change. Stable materials 0-20%.	(16)
Scouring and Deposition	Less than 5% of the bottom affected by scouring and deposition.	(6)	5-30% affected. Scour at constrictions and where grades steepen. Some deposition in pools.	(12)	30-50% affected. Deposits & scour at obstructions, constrictions, and bends. Some filling of pools.	(18)	More than 50% of the bottom in a state of flux or change nearly yearlong.	(24)
Clinging Aquatic Vegetation (Moss & Algae)	Abundant. Growth largely moss like, dark green, perennial. In swift water too.	(1)	Common. Algal forms in low velocity & pool areas. Moss here too and swifter waters.	(2)	Present but spotty, mostly in backwater areas. Seasonal blooms make rocks slick.	(3)	Perennial types scarce or absent. Yellow-green, short term blooms may be present.	(4)
	COLUMN TOTALS →	5	→	24	→	68	→	

Add the values in each column for a total reach score here. (E. 5 + G. 24 + F. 68 + F. ___ = 97).

Reach score of: <38=Exellent, 39-76=Good, 77-114=Fair, 115=Poor.

Form R-1 2500-5 (6-73)

OVER

STREAM NUMBER & NAME: Beetle Creek STATIONS: 1 (1000'long) DATE: 8/22/79

	WIDTH		DEPTH		VELOCITY	VOLUME
	Present	Full	Present	Full		
Pool	15	25	1.5	4.0	1 FS	10 CFS
Riffle	12'	20'	0.5'	2.5'	2-3 FS	10 CFS
Run						

Air: 75 GRADIENT 6%

TEMPERATURE Water: 53° STABILITY RATING 59 TURBIDITY: (Clear) Milky Muddy

% POOL (1, 2 and 3) 5 % RIFFLE 95 % RUN ____ % GLIDE ____

POOL CLASSES: % CLASS 1: 5 % CLASS 2: - % CLASS 3 - % CLASS 4: 95

BOTTOM MATERIALS:	Very Abundant (> 70%)	Abundant (41 to 70%)	Common (11 to 40%)	Present (< 10%)	None 0
Organic Debris:				2	
Clay/Silt:				1	
Sand:				2	
Fine Gravel (0.1 to 1"):				2	
Coarse Gravel (1 to 3"):				3	
Small Rubble (3 to 6") :		10			
Large Rubble (6 to 12"):		20			
Boulders (>12"):		60			
Bed Rock:					X
AQUATIC VEGETATION:				X	

INSTREAM COVER: (Good) Fair Poor None

Cover Types (Indicate relative importance A > C > P): Logs P Rocks A Bottom Color Mottled; Undercut Banks N/A Water Color Clear; Choppy Surface C Overhanging Vegetation None

BANK COVER: Good (Fair) Poor None

Major Plant Species: (Indicate relative importance: A > C > P) Overstory Cedar, fir, spruce; Understory Alder; Surface Grass, bunchberry, scirpus, devils club

FISH FOOD ORGANISMS: >25/ft² 16-25/ft² 6-15/ft² (1-5/ft²)

Food Types: Caddisflies C Mayflies: A Stoneflies: C Diptera P (Indicate relative abundance A>C>P) Snails: ___ Leeches: ___ SIZE: (S) M L

SPAWNING HABITAT: Very Good Good Fair Poor None

	Very Good	Good	Fair	Poor	None
% Gravel	>50%	35-50%	20-34%	10-19% (5%)	<10%
Velocity	Must be between 0.5 and 3 FPS				
Depth	Must be between 4 inches and 3 feet				

EMBEDDEDNESS (0) 1/3 2/3 Full

VALLEY BOTTOM TYPE: >300 ft. 100-300 ft. (<100 ft.)

LAND FORM GRADIENT: <5% 5-10% 11-20% (21-30%) >30%

LIMITING FACTORS: 1) Steep gradient, 2) lack of pools, 3) low conductivity, 4) low aquatic insect population.

ADDITIONAL OBSERVATIONS: Culvert block and causing streambed erosion. Lower 100' of section has 2 big log jams - stream unstable below culvert.

LAND MARKS: 500' on either side of culvert on Rd. 338

INVESTIGATOR: B. May

* = Estimates

R-1 STREAM CHANNEL STABILITY FIELD EVALUATION FORM

Item Rated	Stability Indicators by Classes							
	EXCELLENT		GOOD		FAIR		POOR	
UPPER BANKS								
Landform Slope	Bank slope gradient <30%.	(2)	Bank slope gradient 30-40%.	(4)	Bank slope gradient 40-60%.	(6)	Bank slope gradient 60% +	(8)
Mass Wasting (Existing or Potential)	No evidence of past or potential for future mass wasting into channels.	(3)	Infrequent and/or very small, mostly healed over. Low future potential.	(6)	Moderate frequency & size, with some raw spots eroded by water during high flows.	(9)	Frequent or large, causing sediment nearly yearlong OR imminent danger of same.	(12)
Debris Jam Potential (Floatable Objects)	Essentially absent from immediate channel area.	(2)	Present but mostly small twigs and limbs.	(4)	Present, volume and size are both increasing.	(6)	Moderate to heavy amounts, predominantly larger sizes.	(8)
Bank Protection from Vegetation	90% + plant density. Vigor and variety suggests a deep, dense root mass.	(3)	70-90% density. Fewer plant species or lower vigor suggests a less dense or deep root mass.	(6)	50-70% density. Lower vigor and still fewer species form a somewhat shallow and discontinuous root mass.	(9)	<50% density plus fewer species & less vigor indicate poor, discontinuous, and shallow root mass.	(12)
LOWER BANKS								
Channel Capacity	Ample for present plus some increases. Peak flows contained, W/D ratio <7.	(1)	Adequate. Overbank flows rare. Width to Depth (W/D) ratio 8-15.	(2)	Barely contains present peaks. Occasional overbank floods. W/D ratio 15-25.	(3)	Inadequate. Overbank flows common. W/D ratio >25.	(4)
Bank Rock Content	65% + with large, angular boulders 12" + numerous.	(2)	40 to 65%, mostly small boulders to cobble 6-12".	(4)	20 to 40% , with most in the 3-6" diameter class.	(6)	<20% rock fragments of gravel sizes, 1-3" or less.	(8)
Obstructions Flow Deflectors Sediment Traps	Rocks, old logs firmly embedded. Flow pattern of pool & riffles stable without cutting or deposition.	(2)	Some present, causing erosive cross currents and minor pool filling. Obstructions and deflectors newer and less firm.	(4)	Moderately frequent, moderately unstable obstructions & deflectors move with high water causing bank cutting and filling of pools.	(6)	Frequent obstructions and deflectors cause bank erosion yearlong. Sed. traps full, channel migration occurring.	(8)
Cutting	Little or none evident. Infrequent raw banks less than 6" high generally.	(4)	Some, intermittently at outcurves & constrictions. Raw banks may be up to 12".	(8)	Significant. Cuts 12"-24" high. Root mat overhange and sloughing evident.	12)	Almost continuous cuts, some over 24" high. Failure of overhangs frequent.	(16)
Deposition	Little or no enlargement of channel or point bars.	(4)	Some new increas in bar formation, most from coarse gravels.	(8)	Moderate deposition of new gravel & coarse sand on old and some new bars.	(12)	Extensive deposits of predominately fine particles. Accelerated bar development.	(16)
BOTTOM								
Rock Angularity	Sharp edges and corners, plane surfaces roughened.	(1)	Rounded corners & edges, surfaces smooth & flat.	(2)	Corners & edges well rounded in two dimensions.	(3)	Well rounded in all dimensions, surfaces smooth.	(4)
Brightness	Surfaces dull, darkened, or stained. Gen. not "bright".	(1)	Mostly dull but may have up to 35% bright surfaces.	(2)	Mixture, 50-50% dull and bright, ± 15%, ie 35-65%.	(3)	Predominately bright, 65% + exposed or scoured surfaces.	(4)
Consolidation or Particle Packing	Assorted sizes tightly packed and/or overlapping.	(2)	Moderately packed with some overlapping.	(4)	Mostly a loose assortment with no apparent overlap.	(6)	No packing evident. Loose assortment, easily moved.	(8)
Bottom Size Distribution & Percent Stable Materials	No change in sizes evident. Stable materials 80-100%.	(4)	Distribution shift slight. Stable materials 50-80%.	(8)	Moderate change in sizes. Stable materials 20-50%.	(12)	Marked distribution change. Stable materials 0-20%.	(16)
Scouring and Deposition	Less than 5% of the bottom affected by scouring and deposition.	(6)	5-30% affected. Scour at constrictions and where grades steeper. Some deposition in pools.	(12)	30-50% affected. Deposits & scour at obstructions, constrictions, and bends. Some filling of pools.	(18)	More than 50% of the bottom in a state of flux or change nearly yearlong.	(24)
Clinging Aquatic Vegetation (Moss & Algae)	Abundant. Growth largely moss like, dark green, perennial, in swift water too.	(1)	Common. Algal forms in low velocity & pool areas. Moss here too and swifter waters.	(2)	Present but spotty, mostly in backwater areas. Seasonal blooms make rocks slick.	(3)	Perennial types scarce or absent. Yellow-green, short term blooms may be present.	(4)
	COLUMN TOTALS →	18		38		3		

Add the values in each column for a total reach score here. (E. 18 + G. 38 + F. 3 + F. ___ = 59).

Reach score of: <38=Exellent, 39-76=Good, 77-114=Fair, 115=Poor.

Form R-1 2500-5 (6-73)

OVER

STREAM NUMBER & NAME: Pete Creek

STATIONS: 500' on either side of Rd.338 culvert above Slim Cr.

DATE: 8/22/79

	WIDTH Present	WIDTH Full	DEPTH Present	DEPTH Full	VELOCITY	VOLUME
Pool	30	35	1.5'	4.0		10-15 CFS
Riffle	15	20	0.5'	3.5	2-3 FS	10-15
Run						

Air: 65°

Water: 53°

GRAOIENT 2%

TEMPFRATURE

STABILITY RATING Good(57)

TURBIOITY: Clear / Milky / Muddy

% POOL(1, 2 and 3) 5%

% RIFFLE 60-70%

% RUN –

% GLIDE 15%

POOL CLASSES: % CLASS 1: 10 % CLASS 2: – % CLASS 3 – % CLASS 4: 90

BOTTOM MATERIALS:	Very Abundant (> 70%)	Abundant (41 to 70%)	Common (11 to 40%)	Present (< 10%)	None 0
Organic Debris:				X 1	
Clay/Silt:				X 2	
Sand:				X 2	
Fine Gravel (0.1 to 1"):				X 5	
Coarse Gravel (1 to 3"):				X 5	
Small Rubble (3 to 6") :		20			
Large Rubble (6 to 12"):		20			
Boulders (>12"):		30			
Bed Rock:			10		
AQUATIC VEGETATION:				X	

INSTREAM COVER: Good (Fair) Poor None

Cover Types (Indicate relative importance A > C > P)
Logs P Rocks A Bottom Color mottled, mostly dark
Undercut Banks P Water Color clear
Choppy Surface A Overhanging Vegetation P

BANK COVER: (Good) Fair Poor None

Major Plant Species: (Indicate relative importance: A > C > P)
Overstory Larch, D-fir, spruce
Understory Alder, mtn. maple, dogwood
Surface Grass, thimbleberry, scirpus

FISH FOOD ORGANISMS: >25/ft² (16-25/ft²) 6-15/ft² 1-5/ft²
Food Types: Caddisflies A Mayflies: A Stoneflies: C Diptera C
(Indicate relative abundance A>C>P) Snails: Leeches:
SIZE: (S) M L

SPAWNING HABITAT: Very Good Good Fair Poor None

	>50%	35-50%	20-34%	(10-19%)	<10%
% Gravel					
Velocity	Must be between 0.5 and 3 FPS				
Oepth	Must be between 4 inches and 3 feet				

EMBEODEDNESS 0 (1/4) 1/3 2/3 Full

VALLEY BOTTOM TYPE: (>300 ft.) \ / 100-300 ft. \ / <100 ft.

LAND FORM GRAOIENT: (<5%) 5-10% 11-20% 21-30% >30%

LIMITING FACTORS: 1) Lack of pool formation, 2) low alkalinities, 3) aquatic _____, 4) low summer & fall flows.

ADDITIONAL OBSERVATIONS: Culvert may be barrier during spring flows.

LAND MARKS: Culvert on Rd. 338 above Slim Creek.

INVESTIGATOR:

* = Estimates

R-1 STREAM CHANNEL STABILITY FIELD EVALUATION FORM

Item Rated	Stability Indicators by Classes							
	EXCELLENT		GOOD		FAIR		POOR	
UPPER BANKS								
Landform Slope	Bank slope gradient <30%.	(2)	Bank slope gradient 30-40%.	(4)	Bank slope gradient 40-60%.	(6)	Bank slope gradient 60% +	(8)
Mass Wasting (Existing or Potential)	No evidence of past or potential for future mass wasting into channels.	(3)	Infrequent and/or very small. Mostly healed over. Low future potential.	(6)	Moderate frequency & size, with some raw spots eroded by water during high flows.	(9)	Frequent or large, causing sediment nearly yearlong OR imminent danger of same.	(12)
Debris Jam Potential (Floatable Objects)	Essentially absent from immediate channel area.	(2)	Present but mostly small twigs and limbs.	(4)	Present, volume and size are both increasing.	(6)	Moderate to heavy amounts, predominantly larger sizes.	(8)
Bank Protection from Vegetation	90% + plant density. Vigor and variety suggests a deep, dense root mass.	(3)	70-90% density. Fewer plant species or lower vigor suggests a less dense or deep root mass.	(6)	50-70% density. Lower vigor and still fewer species form a somewhat shallow and discontinuous root mass.	(9)	<50% density plus fewer species & less vigor indicate poor, discontinuous, and shallow root mass.	(12)
LOWER BANKS								
Channel Capacity	Ample for present plus some increases. Peak flows contained, W/D ratio <7.	(1)	Adequate. Overbank flows rare. Width to Depth (W/D) ratio 8-15.	(2)	Barely contains present peaks. Occasional overbank floods. W/D ratio 15-25.	(3)	Inadequate. Overbank flows common. W/D ratio >25.	(4)
Bank Rock Content	65% + with large, angular boulders 12" + numerous.	(2)	40 to 65%, mostly small boulders to cobble 6-12".	(4)	20 to 40% , with most in the 3-6" diameter class.	(6)	<20% rock fragments of gravel sizes, 1-2" or less.	(8)
Obstructions Flow Deflectors Sediment Traps	Rocks, old logs firmly embedded. Flow pattern of pool & riffles stable without cutting or deposition.	(2)	Some present, causing erosive cross currents and minor pool filling. Obstructions and deflectors newer and less firm.	(4)	Moderately frequent, moderately unstable obstructions & deflectors move with high water causing bank cutting and filling of pools.	(6)	Frequent obstructions and deflectors cause bank erosion yearlong. Sed. traps full, channel migration occurring.	(8)
Cutting	Little or none evident. Infrequent raw banks less than 6" high generally.	(4)	Some, intermittently at outcurves & constrictions. Raw banks may be up to 12".	(8)	Significant. Cuts 12"-24" high. Root mat overhangs and sloughing evident.	(12)	Almost continuous cuts, some over 24" high. Failure of overhangs frequent.	(16)
Deposition	Little or no enlargement of channel or point bars.	(4)	Some new increas in bar formation, most from coarse gravels.	(8)	Moderate deposition of new gravel & coarse sand on old and some new bars.	(12)	Extensive deposits of predominately fine particles. Accelerated bar development.	(16)
BOTTOM								
Rock Angularity	Sharp edges and corners, plane surfaces roughened.	(1)	Rounded corners & edges, surfaces smooth & flat.	(2)	Corners & edges well rounded in two dimensions.	(3)	Well rounded in all dimensions, surfaces smooth.	(4)
Brightness	Surfaces dull, darkened, or stained. Gen. not "bright".	(1)	Mostly dull but may have up to 35% bright surfaces.	(2)	Mixture, 50-50% dull and bright, ± 15%, ie 35-65%.	(3)	Predominately bright, 65% + exposed or scoured surfaces.	(4)
Consolidation or Particle Packing	Assorted sizes tightly packed and/or overlapping.	(2)	Moderately packed with some overlapping.	(4)	Mostly a loose assortment with no apparent overlap.	(6)	No packing evident. Loose assortment, easily moved.	(8)
Bottom Size Distribution & Percent Stable Materials	No change in sizes evident. Stable materials 80-100%.	(4)	Distribution shift slight. Stable materials 50-80%.	(8)	Moderate change in sizes. Stable materials 20-50%.	(12)	Marked distribution change. Stable materials 0-20%.	(16)
Scouring and Deposition	Less than 5% of the bottom affected by scouring and deposition.	(6)	5-30% affected. Scour at constrictions and where grades steeper. Some deposition in pools.	(12)	30-50% affected. Deposits & scour at obstructions, constrictions, and bends. Some filling of pools.	(18)	More than 50% of the bottom in a state of flux or change nearly yearlong.	(24)
Clinging Aquatic Vegetation (Moss & Algae)	Abundant. Growth largely moss like, dark green, perennial. In swift water too.	(1)	Common. Algal forms in low velocity & pool areas. Moss here too and swifter waters.	(2)	Present but spotty, mostly in backwater areas. Seasonal blooms make rocks slick.	(3)	Perennial types scarce or absent. Yellow-green, short term bloom may be present.	(4)
	COLUMN TOTALS →	19		38				

Add the values in each column for a total reach score here. (E. 19 + G. 38 + F. ___ + F. ___ = 57).

Reach score of: 38=Exellent, 39-76=Good, 77-114=Fair, 115=Poor.

Form R-1 2500-5 (6-73)

OVER

STREAM NUMBER & NAME: Rock Creek (Lower) STATIONS: DATE: 9/5/79

	WIDTH Present	WIDTH Full	DEPTH Present	DEPTH Full	VELOCITY	VOLUME
Pool	25	65	3.2	7.0	0.2 FS	5-10 CFS
Riffle	25	60	0.6	3.6	1 FS	6-10 CFS
Run						

TEMPERATURE Air: 72 Water: 47 GRADIENT 10%

STABILITY RATING 108 TURBIDITY: (Clear) Muddy

% POOL (1, 2 and 3) 30 % RIFFLE 70% % RUN ____ % GLIDE ____

POOL CLASSES: % CLASS 1: 11 % CLASS 2: 5 % CLASS 3 17 % CLASS 4: 67%

BOTTOM MATERIALS:	Very Abundant (> 70%)	Abundant (41 to 70%)	Common (11 to 40%)	Present (< 10%)	None 0
Organic Debris:			10		
Clay/Silt:			20		
Sand:			10		
Fine Gravel (0.1 to 1"):			10		
Coarse Gravel (1 to 3"):			10		
Small Rubble (3 to 6") :			20		
Large Rubble (6 to 12"):			15		
Boulders (>12"):			10		
Bed Rock:					X
AQUATIC VEGETATION:				X	

INSTREAM COVER: Good (Fair) Poor None

Cover Types (indicate relative importance A > C > P): Logs C Rocks C Bottom Color mottled; Undercut Banks C Water Color --; Choppy Surface ____ P Overhanging Vegetation P

BANK COVER: Good (Fair) Poor None

Major Plant Species: (indicate relative importance: A > C > P)
Overstory Mostly cedar, larch, fir
Understory Mostly alder, willow
Surface Grass, , thimbleberry

FISH FOOD ORGANISMS: (>25/ft²) 16-25/ft² 6-15/ft² 1-5/ft²
Food Types: Caddisflies C Mayflies: A Stoneflies: Diptera C
(indicate relative abundance A>C>P) Snails: Leeches:
SIZE: S (M) L

SPAWNING HABITAT: Very Good Good Fair (Poor) None

% Gravel	>50%	35-50%	20-34%	10-19%	<10%
Velocity	Must be between 0.5 and 3 FPS				
Depth	Must be between 4 inches and 3 feet				

EMBEDDEDNESS 0 (1/3) 2/3 Full

VALLEY BOTTOM TYPE: (<300 ft.) / 100-300 ft. \ / >100 ft.

LAND FORM GRADIENT: <5% (5-10%) 11-20% 21-30% >30%

LIMITING FACTORS:

ADDITIONAL OBSERVATIONS: Pool dev. good in lower 600',

LAND MARKS:
INVESTIGATOR: B.May

T26N, R32W, S.2

* = Estimates

R-1 STREAM CHANNEL STABILITY FIELD EVALUATION FORM

Item Rated	Stability Indicators by Classes							
	EXCELLENT		GOOD		FAIR		POOR	
UPPER BANKS								
Landform Slope	Bank slope gradient <30%	(2)	Bank slope gradient 30-40%	(4)	Bank slope gradient 40-60%	(6)	Bank slope gradient 60% +	(8)
Mass Wasting (Existing or Potential)	No evidence of past or potential for future mass wasting into channels.	(3)	Infrequent and/or very small. Mostly healed over. Low future potential.	(6)	Moderate frequency & size, with some raw spots eroded by water during high flows.	(9)	Frequent or large, causing sediment nearly yearlong OR imminent danger of same.	(12)
Debris Jam Potential (Floatable Objects)	Essentially absent from immediate channel area.	(2)	Present but mostly small twigs and limbs.	(4)	Present, volume and size are both increasing.	(6)	Moderate to heavy amounts, predominantly larger sizes.	(8)
Bank Protection from Vegetation	90% + plant density. Vigor and variety suggests a deep, dense root mass.	(3)	70-90% density. Fewer plant species or lower vigor suggests a less dense or deep root mass.	(6)	50-70% density. Lower vigor and still fewer species form a somewhat shallow and discontinuous root mass.	(9)	< 50% density plus fewer species & less vigor indicate poor, discontinuous, and shallow root mass.	(12)
LOWER BANKS								
Channel Capacity	Ample for present plus some increases. Peak flows contained. W/D ratio <7.	(1)	Adequate. Overbank flows rare. Width to Depth (W/D) ratio 8-15.	(2)	Barely contains present peaks. Occasional overbank floods. W/D ratio 15-25.	(3)	Inadequate. Overbank flows common. W/D ratio >25.	(4)
Bank Rock Content	65% + with large, angular boulders 12" + numerous.	(2)	40 to 65%, mostly small boulders to cobble 6-12".	(4)	20 to 40%, with most in the 3-6" diameter class.	(6)	< 20% rock fragments of gravel sizes, 1-3" or less.	(8)
Obstructions Flow Deflectors Sediment Traps	Rocks, old logs firmly embedded. Flow pattern of pool & riffles stable without cutting or deposition.	(2)	Some present, causing erosive cross currents and minor pool filling. Obstructions and deflectors newer and less firm.	(4)	Moderately frequent, moderately unstable obstructions & deflectors move with high water causing bank cutting and filling of pools.	(6)	Frequent obstructions and deflectors cause bank erosion yearlong. Sed. traps full, channel migration occuring.	(8)
Cutting	Little or none evident. Infrequent raw banks less than 6" high generally.	(4)	Some, intermittently at outcurves & constrictions. Raw banks may be up to 12".	(8)	Significant. Cuts 12"-24" high. Root mat overhangs and sloughing evident.	(12)	Almost continuous cuts, some over 24" high. Failure of overhangs frequent.	(16)
Deposition	Little or no enlargement of channel or point bars.	(4)	Some new increas in bar formation, most from coarse gravels.	(8)	Moderate deposition of new gravel & coarse sand on old and some new bars.	(12)	Extensive deposits of predominately fine particles. Accelerated bar development.	(16)
BOTTOM								
Rock Angularity	Sharp edges and corners, plane surfaces roughened.	(1)	Rounded corners & edges, surfaces smooth & flat.	(2)	Corners & edges well rounded in two dimensions.	(3)	Well rounded in all dimensions, surfaces smooth.	(4)
Brightness	Surfaces dull, darkened, or stained. Gen. not "bright".	(1)	Mostly dull but may have up to 35% bright surfaces.	(2)	Mixture, 50-50% dull and bright, ± 15%, ie 35-65%.	(3)	Predominately bright, 65% +, exposed or scoured surfaces.	(4)
Consolidation or Particle Packing	Assorted sizes tightly packed and/or overlapping.	(2)	Moderately packed with some overlapping.	(4)	Mostly a loose assortment with no apparent overlap.	(6)	No packing evident. Loose assortment, easily moved.	(8)
Bottom Size Distribution & Percent Stable Materials	No change in sizes evident. Stable materials 80-100%.	(4)	Distribution shift slight. Stable materials 50-80%.	(8)	Moderate change in sizes. Stable materials 20-50%.	(12)	Marked distribution change. Stable materials 0-20%.	(16)
Scouring and Deposition	Less than 5% of the bottom affected by scouring and deposition.	(6)	5-30% affected. Scour at constrictions and where grades steeper. Some deposition in pools.	(12)	30-50% affected. Deposits & scour at obstructions, constrictions, and bends. Some filling of pools.	(18) 20	More than 50% of the bottom in a state of flux or change nearly yearlong.	(24)
Clinging Aquatic Vegetation (Moss & Algae)	Abundant. Growth largely moss like, dark green, perennial. In swift water too.	(1)	Common. Algal forms in low velocity & pool areas. Moss here too and swifter waters.	(2)	Present but spotty, mostly in backwater areas. Seasonal blooms make rocks slick.	(3)	Perennial types scarce or absent. Yellow-green, short term blooms may be present.	(4)
	COLUMN TOTALS →	5		2		101		

Add the values in each column for a total reach score here. (E. 5 + G. 2 + F. 101 + P. ___ = 108).

Reach score of: (36=Exellent, 39-76=Good, 77-114=Fair, 115=Poor.

Form R-1 2500-5 (6-73)

OVER

STREAM NUMBER & NAME: Rock Creek STATIONS: Upper DATE: 9/5/79

	WIDTH Present	WIDTH Full	DEPTH Present	DEPTH Full	VELOCITY	VOLUME
Pool	15	25	20	4.5	1 FS	20 CFS
Riffle						
Run						

TEMPERATURE Air: _____ Water: _____ GRADIENT 4% STABILITY RATING _____ TURBIDITY: (Clear) Milky Muddy

% POOL (1, 2 and 3) 10 % RIFFLE 90 (Cascaded) % RUN _____ % GLIDE _____

POOL CLASSES: % CLASS 1: _____ % CLASS 2: _____ % CLASS 3 12 % CLASS 4. 88

BOTTOM MATERIALS:	Very Abundant (> 70%)	Abundant (41 to 70%)	Common (11 to 40%)	Present (< 10%)	None 0
Organic Debris:				5	
Clay/Silt:				3	
Sand:				2	
Fine Gravel (0.1 to 1"):				4	
Coarse Gravel (1 to 3"):				6	
Small Rubble (3 to 6") :				5	
Large Rubble (6 to 12"):			15		
Boulders (>12"):		60%			
Bed Rock:				P	
AQUATIC VEGETATION:				P	

INSTREAM COVER: Good (Fair) Poor None

Cover Types (Indicate relative importance A > C > P): Logs P Rocks A Bottom Color dark; Undercut Banks None Water Color clear; Choppy Surface A Overhanging Vegetation P

BANK COVER: Good (Fair) Poor None

Major Plant Species: (Indicate relative importance: A > C > P) Overstory Cedar, larch, fir; Understory Alder, dogwood; Surface Grass, thimbleberry, devils club

FISH FOOD ORGANISMS: >25/ft² (16-25/ft²) 6-15/ft² 1-5/ft²

Food Types: Caddisflies C Mayflies: A Stoneflies: P Diptera P (Indicate relative abundance A>C>P) Snails: ___ Leeches: ___ SIZE: (S) M L

SPAWNING HABITAT: Very Good Good Fair Very Poor None

% Gravel	>50%	35-50%	20-34%	10-19%	<10%
Velocity	Must be between 0.5 and 3 FPS				
Depth	Must be between 4 inches and 3 feet				

EMBEDDEDNESS (0) 1/3 2/3 Full

VALLEY BOTTOM TYPE: >300 ft. 100-300 ft. <100 ft.

LAND FORM GRADIENT: <5% (5-10%) 11-20% 21-30% >30%

LIMITING FACTORS: (1) Low alkalinities, productivity (2) pool development (3) high gradient (4) lack of well defined riffles for food production. Cascades over boulders rather than riffles.

ADDITIONAL OBSERVATIONS: Lack of overstory, high gradient tumbling mt. stream with pockets - rubble habitat - sterile environment, low alkalinities.

LAND MARKS: 500' on either side of boundary 150A T26N R32W S.1

INVESTIGATOR: B.May

* = Estimates

R-1 STREAM CHANNEL STABILITY FIELD EVALUATION FORM

Item Rated	Stability Indicators by Classes							
	EXCELLENT		GOOD		FAIR		POOR	
UPPER BANKS								
Landform Slope	Bank slope gradient <30%	(2)	Bank slope gradient 30-40%	(4)	Bank slope gradient 40-60%	(6)	Bank slope gradient 60% +	(8)
Mass Wasting (Existing or Potential)	No evidence of past or potential for future mass wasting into channels.	(3)	Infrequent and/or very small. Mostly healed over. Low future potential.	(6)	Moderate frequency & size, with some raw spots eroded by water during high flows.	(9)	Frequent or large, causing sediment nearly yearlong OR imminent danger of same.	(12)
Debris Jam Potential (Flowtable Objects)	Essentially absent from immediate channel area.	(2)	Present but mostly small twigs and limbs.	(4)	Present, volume and size are both increasing.	(6)	Moderate to heavy amounts, predominantly larger sizes.	(8)
Bank Protection from Vegetation	90% + plant density. Vigor and variety suggests a deep, dense root mass.	(3)	70-90% density. Fewer plant species or lower vigor suggests a less dense or deep root mass.	(6)	50-70% density. Lower vigor and still fewer species form a somewhat shallow and discontinuous root mass.	(9)	< 50% density plus fewer species & less vigor indicate poor, discontinuous, and shallow root mass.	(12)
LOWER BANKS								
Channel Capacity	Ample for present plus some increases. Peak flows contained. W/D ratio <7.	(1)	Adequate. Overbank flows rare. Width to Depth (W/D) ratio 8-15.	(2)	Barely contains present peaks. Occasional overbank floods. W/D ratio 15-25.	(3)	Inadequate. Overbank flows common. W/D ratio >25.	(4)
Bank Rock Content	65% + with large, angular boulders 12" + numerous.	(2)	40 to 65%, mostly small boulders to cobble 6-12".	(4)	20 to 40% , with most in the 3-6" diameter class.	(6)	< 20% rock fragments of gravel sizes, 1-3" or less.	(8)
Obstructions Flow Deflectors Sediment Traps	Rocks, old logs firmly embedded. Flow pattern of pool & riffles stable without cutting or deposition.	(2)	Some present, causing erosive cross currents and minor pool filling. Obstructions and deflectors newer and less firm.	(4)	Moderately frequent, moderately unstable obstructions & deflectors move with high water causing bank cutting and filling of pools.	(6)	Frequent obstructions and deflectors cause bank erosion yearlong. Sed. traps full, channel migration occuring.	(8)
Cutting	Little or none evident. Infrequent raw banks less than 6" high generally.	(4)	Some, intermittently at outcurves & constrictions. Raw banks may be up to 12".	(8)	Significant. Cuts 12"-24" high. Root mat overhangs and sloughing evident.	(12)	Almost continuous cuts, some over 24" high. Failure of overhangs frequent.	(16)
Deposition	Little or no enlargement of channel or point bars.	(4)	Some new increas in bar formation, most from coarse gravels.	(8)	Moderate deposition of new gravel & coarse sand on old and some new bars.	(12)	Extensive deposits of predominately fine particles. Accelerated bar development.	(16)
BOTTOM								
Rock Angularity	Sharp edges and corners, plane surfaces roughened.	(1)	Rounded corners & edges, surfaces smooth & flat.	(2)	Corners & edges well rounded in two dimensions.	(3)	Well rounded in all dimensions, surfaces smooth.	(4)
Brightness	Surfaces dull, darkened, or stained. Gen. not "bright".	(1)	Mostly dull but may have up to 35% bright surfaces.	(2)	Mixture, 50-50% dull and bright, ± 15%, ie 35-65%.	(3)	Predominately bright, 65% + exposed or scoured surfaces.	(4)
Consolidation or Particle Packing	Assorted sizes tightly packed and/or overlapping.	(2)	Moderately packed with some overlapping.	(4)	Mostly o loose assortment with no apparent overlap.	(6)	No packing evident. Loose assortment, easily moved.	(8)
Bottom Size Distribution & Percent Stable Materials	No change in sizes evident. Stable materials 80-100%.	(4)	Distribution shift slight. Stable materials 50-80%.	(8)	Moderate change in sizes. Stable materials 20-50%.	(12)	Marked distribution change. Stable materials 0-20%.	(16)
Scouring and Deposition	Less than 5% of the bottom affected by scouring and deposition.	(6)	5-30% affected. Scour at constrictions and where grades steeper. Some deposition in pools.	(12)	30-50% affected. Deposits & scour at obstructions, constrictions, and bends. Some filling of pools.	(18)	More than 50% of the bottom in a state of flux or change nearly yearlong.	(24)
Clinging Aquatic Vegetation (Moss & Algae)	Abundant. Growth largely moss like, dark green, perennial. In swift water too.	(1)	Common. Algal forms in low velocity & pool areas. Moss here too and swifter waters.	(2)	Present but spotty, mostly in backwater areas. Seasonal blooms make rocks slick.	(3)	Perennial types scarce or absent. Yellow-green, short term bloom may be present.	(4)
	COLUMN TOTALS →	14		42				

Add the values in each column for a total reach score here. (E. 14 + G. 42 + F. ___ + F. ___ = 56).

Reach score of: <38=Exellent, 39-76=Good, 77-114=Fair, 115=Poor.

Form R-1 2500-5 (6-73)

OVER

STREAM NUMBER & NAME: Big Creek STATIONS: DATE: 8/30/79

	WIDTH Present	WIDTH Full	DEPTH Present	DEPTH Full	VELOCITY	VOLUME
Pool	25	70	2.0	6.0	0.2-0.5 FS	20 CFS
Riffle	25	60	0.8'	5.0'	1-2 FS	20 CFS
Run						

TEMPERATURE Air: 70° GRADIENT 2%

Water: 57°F STABILITY RATING 96 Fair TURBIDITY: (Clear) Milky Muddy

% POOL (1, 2 and 3) 15 % RIFFLE 60 % RUN % GLIDE 25

POOL CLASSES: % CLASS 1: - % CLASS 2: - % CLASS 3 20 % CLASS 4: 80

BOTTOM MATERIALS:	Very Abundant (> 70%)	Abundant (41 to 70%)	Common (11 to 40%)	Present (< 10%)	None 0
Organic Debris:				5	
Clay/Silt:				5	
Sand:				5	
Fine Gravel (0.1 to 1"):					
Coarse Gravel (1 to 3"):			10		
Small Rubble (3 to 6") :			20		
Large Rubble (6 to 12"):			30		
Boulders (>12"):			30		
Bed Rock:				1%	
AQUATIC VEGETATION:				10%	

INSTREAM COVER: Good (Fair) Poor None

Cover Types (Indicate relative importance A > C > P) Logs P Rocks A Bottom Color mottled

Undercut Banks - Water Color -

Choppy Surface A Overhanging Vegetation P

BANK COVER: Good (Fair) Poor None

Major Plant Species: (Indicate relative importance: A > C > P)

Overstory Cedar, spruce, fir, larch

Understory Alder, birch, mtn. maple

Surface Grass, thimbleberry

FISH FOOD ORGANISMS: (>25/ft²) 16-25/ft² 6-15/ft² 1-5/ft²

Food Types: Caddisflies A Mayflies: C Stoneflies: C Diptera C

(Indicate relative abundance A>C>P) Snails: Leeches:

SIZE: (S) M L

SPAWNING HABITAT: Very Good Good Fair (Poor) None

% Gravel	>50%	35-50%	20-34%	10-19%	<10%
Velocity	Must be between 0.5 and 3 FPS				
Depth	Must be between 4 inches and 3 feet				

EMBEDDEDNESS (0) 1/3 2/3 Full

VALLEY BOTTOM TYPE: >300 ft. (100-300 ft.) <100 ft.

LAND FORM GRADIENT: <5% 5-10% 11-20% 21-30% >30%

LIMITING FACTORS: 1) Low alkalinities 2) high spring flows, low summer flows 3) lack of pool formation 4) lack of bank cover (brush and undercuts).

ADDITIONAL OBSERVATIONS: Bank has lack of understory and ground cover. High scouring spring flows and bedload movement limit primary production. Section has good rearing habitat, but not many niches for fish over 7.0".

LAND MARKS: 1.2 miles above Steep Creek Road - 1000' section

INVESTIGATOR: B. May

* = Estimates

R-1 STREAM CHANNEL STABILITY FIELD EVALUATION FORM

Item Rated	Stability Indicators by Classes							
	EXCELLENT		GOOD		FAIR		POOR	
UPPER BANKS								
Landform Slope	Bank slope gradient <30%	(2)	Bank slope gradient 30-40%	(4)	Bank slope gradient 40-60%	(6)	Bank slope gradient 60% +	(8)
Mass Wasting (Existing or Potential)	No evidence of past or potential for future mass wasting into channels.	(3)	Infrequent and/or very small. Mostly healed over. Low future potential.	(6)	Moderate frequency & size, with some raw spots eroded by water during high flows.	(9)	Frequent or large, causing sediment nearly yearlong OR imminent danger of same.	(12)
Debris Jam Potential (Floatable Objects)	Essentially absent from immediate channel area.	(2)	Present but mostly small twigs and limbs.	(4)	Present, volume and size are both increasing.	(6)	Moderate to heavy amounts, predominantly larger sizes.	(8)
Bank Protection from Vegetation	90% + plant density. Vigor and variety suggests a deep, dense root mass.	(3)	70-90% density. Fewer plant species or lower vigor suggests a less dense or deep root mass.	(6)	50-70% density. Lower vigor and still fewer species form a somewhat shallow and discontinuous root mass.	(9)	<50% density plus fewer species & less vigor indicate poor, discontinuous, and shallow root mass.	(12)
LOWER BANKS								
Channel Capacity	Ample for present plus some increases. Peak flows contained. W/D ratio <7.	(1)	Adequate. Overbank flows rare. Width to Depth (W/D) ratio 8-15.	(2)	Barely contains present peaks. Occasional overbank floods. W/D ratio 15-25.	(3)	Inadequate. Overbank flows common. W/D ratio >25.	(4)
Bank Rock Content	65% + with large, angular boulders 12" + numerous.	(2)	40 to 65%, mostly small boulders to cobble 6-12".	(4)	20 to 40% , with most in the 3-6" diameter class.	(6)	<20% rock fragments of gravel sizes, 1-3" or less.	(8)
Obstructions Flow Deflectors Sediment Traps	Rocks, old logs firmly embedded. Flow pattern of pool & riffles stable without cutting or deposition.	(2)	Some present, causing erosive cross currents and minor pool filling. Obstructions and deflectors newer and less firm.	(4)	Moderately frequent, moderately unstable obstructions & deflectors move with high water causing bank cutting and filling of pools.	(6)	Frequent obstructions and deflectors cause bank erosion yearlong. Sed. traps full, channel migration occuring.	(8)
Cutting	Little or none evident. Infrequent raw banks less than 6" high generally.	(4)	Some, intermittently at outcurves & constrictions. Raw banks may be up to 12".	(6)	Significant. Cuts 12"-24" high. Root mat overhangs and sloughing evident.	(12)	Almost continuous cuts, some over 24" high. Failure of overhangs frequent.	(16)
Deposition	Little or no enlargement of channel or point bars.	(4)	Some new increas in bar formation, most from coarse gravels.	(8)	Moderate deposition of new gravel & coarse sand on old and some new bars.	(12)	Extensive deposits of predominately fine particles. Accelerated bar development.	(16)
BOTTOM								
Rock Angularity	Sharp edges and corners, plane surfaces roughened.	(1)	Rounded corners & edges, surfaces smooth & flat.	(2)	Corners & edges well rounded in two dimensions.	(3)	Well rounded in all dimensions, surfaces smooth.	(4)
Brightness	Surfaces dull, darkened, or stained. Gen. not "bright".	(1)	Mostly dull but may have up to 35% bright surfaces.	(2)	Mixture, 50-50% dull and bright, ± 15%, ie 35-65%.	(3)	Predominately bright, 65% +, exposed or scoured surfaces.	(4)
Consolidation or Particle Packing	Assorted sizes tightly packed and/or overlapping.	(2)	Moderately packed with some overlapping.	(4)	Mostly a loose assortment with no apparent overlap.	(6)	No packing evident. Loose assortment, easily moved.	(8)
Bottom Size Distribution & Percent Stable Materials	No change in sizes evident. Stable materials 80-100%.	(4)	Distribution shift slight. Stable materials 50-80%.	(8)	Moderate change in sizes. Stable materials 20-50%.	(12)	Marked distribution change. Stable materials 0-20%.	(16)
Scouring and Deposition	Less than 5% of the bottom affected by scouring and deposition.	(6)	5-30% affected. Scour at constrictions and where grades steeper. Some deposition in pools.	(12)	30-50% affected. Deposits & scour at obstructions, constrictions, and bends. Some filling of pools.	(18)	More than 50% of the bottom in a state of flux or change nearly yearlong.	(24)
Clinging Aquatic Vegetation (Mosses & Algae)	Abundant. Growth largely moss like, dark green, perennial, in swift water too.	(1)	Common. Algal forms in low velocity & pool areas. Moss here too and swifter waters.	(2)	Present but spotty, mostly in backwater areas. Seasonal blooms make rocks slick.	(3)	Perennial types scarce or absent. Yellow-green, short term blooms may be present.	(4)
COLUMN TOTALS →	4		24		68			

Add the values in each column for a total reach score here. (E. 4 + G. 24 + F. 68 + P. ___ = 96).

Reach score of: <36=Exellent, 39-76=Good, 77-114=Fair, 115=Poor.

Form R-1 2500-5 (6-73)

OVER

STREAM NUMBER & NAME: Callahan Creek STATIONS: T31N R34W S20 DATE: 8/17/79

	WIDTH		DEPTH		VELOCITY	VOLUME
	Present	Full	Present	Full		
Pool						
Riffle	25'	200'	5"	5'	2.5	25 CFS
Run						

TEMPERATURE Air: 75° GRADIENT 1-2%

Water: 55° STABILITY RATING Fair TURBIDITY: (Clear) Milky Muddy

% POOL (1, 2 and 3) 20 % RIFFLE 80 % RUN ____ % GLIDE ____

POOL CLASSES: % CLASS 1: 25 % CLASS 2: 5 % CLASS 3 25 % CLASS 4: 45

BOTTOM MATERIALS:	Very Abundant (> 70%)	Abundant (41 to 70%)	Common (11 to 40%)	Present (< 10%)	None 0
Organic Debris:				X	
Clay/Silt:				X	
Sand:				X	
Fine Gravel (0.1 to 1"):				X	
Coarse Gravel (1 to 3"):			X		
Small Rubble (3 to 6") :		X			
Large Rubble (6 to 12"):			X		
Boulders (>12"):			X		
Bed Rock:				X	
AQUATIC VEGETATION:				X	

INSTREAM COVER: Good (Fair) Poor None

Cover Types (Indicate relative importance A > C > P)
Logs P Rocks A Bottom Color C
Undercut Banks P Water Color -
Choppy Surface C Overhanging Vegetation -

BANK COVER: Good (Fair) Poor None

Major Plant Species: (Indicate relative importance: A > C > P)
Overstory Cottonwoods, cedar, spruce, D.-fir
Understory Alder, bog birch, mtn. maple
Surface Thimbleberry, grass, equisitum

FISH FOOD ORGANISMS: >25/ft² (16-25/ft²) 6-15/ft² 1-5/ft²
Food Types: Caddisflies P Mayflies: A Stoneflies: P Diptera P
(Indicate relative abundance A>C>P) Snails: ____ Leeches: ____
SIZE: S (M) L

SPAWNING HABITAT: Very Good Good Fair (Poor) None

% Gravel	>50%	35-50%	20-34%	10-19%	<10%
Velocity	Must be between 0.5 and 3 FPS				
Depth	Must be between 4 inches and 3 feet				

EMBEDDEDNESS (0) 1/3 2/3 Full

VALLEY BOTTOM TYPE: (>300 ft.) \ 100-300 ft. / <100 ft.

LAND FORM GRADIENT: (<5%) 5-10% 11-20% 21-30% >30%

LIMITING FACTORS: 1) High spring scouring flows and low summer and fall flows.
2) Lack of pool development. 3) Low alkalinities and low insect production.

ADDITIONAL OBSERVATIONS: Unstable channel that carries much bedload during runoff. Channel braided with numerous high water channels.

LAND MARKS:
INVESTIGATOR: B, May

* = Estimates

R-1 STREAM CHANNEL STABILITY FIELD EVALUATION FORM

Item Rated	Stability Indicators by Classes							
	EXCELLENT		GOOD		FAIR		POOR	
UPPER BANKS								
Landform Slope	Bank slope gradient <30%	(2)	Bank slope gradient 30-40%	(4)	Bank slope gradient 40-60%	(6)	Bank slope gradient 60% +	(8)
Mass Wasting (Existing or Potential)	No evidence of past or potential for future mass wasting into channels.	(3)	Infrequent and/or very small. Mostly healed over. Low future potential.	(6)	Moderate frequency & size, with some raw spots eroded by water during high flows.	(9)	Frequent or large, causing sediment nearly yearlong OR imminent danger of same.	(12)
Debris Jam Potential (Flotable Objects)	Essentially absent from immediate channel area.	(2)	Present but mostly small twigs and limbs.	(4)	Present, volume and size are both increasing.	(6)	Moderate to heavy amounts, predominantly larger sizes.	(8)
Bank Protection from Vegetation	90% + plant density. Vigor and variety suggests a deep, dense root mass.	(3)	70-90% density. Fewer plant species or lower vigor suggests a less dense or deep root mass.	(6)	50-70% density. Lower vigor and still fewer species form a somewhat shallow and discontinuous root mass.	(9)	<50% density plus fewer species & less vigor indicate poor, discontinuous, and shallow root mass.	(12)
LOWER BANKS								
Channel Capacity	Ample for present plus some increases. Peak flows contained. W/D ratio <7.	(1)	Adequate. Overbank flows rare. Width to Depth (W/D) ratio 8-15.	(2)	Barely contains present peaks. Occasional overbank floods. W/D ratio 15-25.	(3)	Inadequate. Overbank flows common. W/D ratio >25.	(4)
Bank Rock Content	65% + with large, angular boulders 12" + numerous.	(1)	40 to 65%, mostly small boulders to cobble 6-12".	(4)	20 to 40% , with most in the 3-6" diameter class.	(6)	<20% rock fragments of gravel sizes, 1-3" or less.	(8)
Obstructions Flow Deflectors Sediment Traps	Rocks, old logs firmly embedded. Flow pattern of pool & riffles stable without cutting or deposition.	(2)	Some present, causing erosive cross currents and minor pool filling. Obstructions and deflectors newer and less firm.	(4)	Moderately frequent, moderately unstable obstructions & deflectors move with high water causing bank cutting and filling of pools.	(6)	Frequent obstructions and deflectors cause bank erosion yearlong. Sed. traps full, channel migration occurring.	(8)
Cutting	Little or none evident. Infrequent raw banks less than 6" high generally.	(4)	Some, intermittently at outcurves & constrictions. Raw banks may be up to 12".	(8)	Significant. Cuts 12"-24" high. Root mat overhangs and sloughing evident.	(12)	Almost continuous cuts, some over 24" high. Failure of overhangs frequent.	(16)
Deposition	Little or no enlargement of channel or point bars.	(4)	Some new increas in bar formation, most from coarse gravels.	(8)	Moderate deposition of new gravel & coarse sand on old and some new bars.	(12) (14)	Extensive deposits of predominately fine particles. Accelerated bar development.	(16)
BOTTOM								
Rock Angularity	Sharp edges and corners, plane surfaces roughened.	(1)	Rounded corners & edges, surfaces smooth & flat.	(2)	Corners & edges well rounded in two dimensions.	(3)	Well rounded in all dimensions, surfaces smooth.	(4)
Brightness	Surfaces dull, darkened, or stained. Gen. not "bright".	(1)	Mostly dull but may have up to 35% bright surfaces.	(2)	Mixture, 50-50% dull and bright, ± 15%, ie 35-65%.	(3)	Predominately bright, 65% +, exposed or scoured surfaces.	(4)
Consolidation or Particle Packing	Assorted sizes tightly packed and/or overlapping.	(2)	Moderately packed with some overlapping.	(4)	Mostly a loose assortment with no apparent overlap.	(6)	No packing evident. Loose assortment, easily moved.	(8)
Bottom Size Distribution & Percent Stable Materials	No change in sizes evident. Stable materials 80-100%.	(4)	Distribution shift slight. Stable materials 50-80%.	(8)	Moderate change in sizes. Stable materials 20-50%.	(12)	Marked distribution change. Stable materials 0-20%.	(16)
Scouring and Deposition	Less than 5% of the bottom affected by scouring and deposition.	(6)	5-30% affected. Scour at constrictions and where grades steeper. Some deposition in pools.	(12)	30-50% affected. Deposits & scour at obstructions, constrictions, and bends. Some filling of pools.	(18) (20)	More than 50% of the bottom in a state of flux or change nearly yearlong.	(24)
Clinging Aquatic Vegetation (Moss & Algae)	Abundant. Growth largely moss like, dark green, perennial. In swift water too.	(1)	Common. Algal forms in low velocity & slow areas. Most here too and swifter waters.	(2)	Present but spotty, mostly in backwater areas. Seasonal blooms make rocks slick.	(3)	Perennial types scarce or absent. Yellow-green, short term blooms may be present.	(4)
	COLUMN TOTALS →	5		44		40		4

Add the values in each column for a total reach score here. (E. 5 + G. 44 + F. 40 + P. 4 = 93).

Reach score of: <36=Exellent, 39-76=Good, 77-114=Fair, 115+=Poor.

Form R-1 2500-5 (6-73)

OVER

STREAM NUMBER & NAME: South Fork Callahan STATIONS: T51N R34W S26 DATE: 8/17/79

	WIDTH		DEPTH		VELOCITY	VOLUME
	Present	Full	Present	Full		
Pool	10'	100'	16"	6'	1.0	10 CFS
Riffle	15	100'	6"	5'	2.0	10 CFS
Run						

TEMPERATURE Air: 60° GRADIENT 3%

Water: 50 STABILITY RATING Fair TURBIDITY: (Clear) Milky Muddy

% POOL (1, 2 and 3) 5 % RIFFLE 85 % RUN ____ % GLIDE 10

POOL CLASSES: % CLASS 1: - % CLASS 2: - % CLASS 3 8 % CLASS 4: 92

BOTTOM MATERIALS:	Very Abundant (> 70%)	Abundant (41 to 70%)	Common (11 to 40%)	Present (< 10%)	None 0
Organic Debris:				X	
Clay/Silt:				X	
Sand:				X	
Fine Gravel (0.1 to 1"):				X	
Coarse Gravel (1 to 3"):			X		
Small Rubble (3 to 6"):		X			
Large Rubble (6 to 12"):		X			
Boulders (>12"):		X			
Bed Rock:					X
AQUATIC VEGETATION:					X

INSTREAM COVER: (Good -) Fair Poor None

Cover Types (Indicate relative importance A > C > P)
Logs - Rocks A Bottom Color ____
Undercut Banks None Water Color clear
Choppy Surface P Overhanging Vegetation None

BANK COVER: Good (Fair) Poor None

Major Plant Species: (Indicate relative importance: A > C > P)
Overstory Spruce, fir, cedar
Understory Alder
Surface Grass, thimbleberry

FISH FOOD ORGANISMS: >25/ft² 16-25/ft² (6-15/ft²) 1-5/ft²
Food Types: Caddisflies P Mayflies: C Stoneflies: P Diptera P
(Indicate relative abundance A>C>P) Snails: ____ Leeches: ____
SIZE: S M (L)

SPAWNING HABITAT: Very Good Good Fair (Poor) None

	>50%	35-50%	20-34%	(10-19%)	<10%
% Gravel					
Velocity	Must be between 0.5 and 3 FPS				
Depth	Must be between 4 inches and 3 feet				

EMBEDDEDNESS (0) 1/3 2/3 Full

VALLEY BOTTOM TYPE: (>300 ft.) 100-300 ft. <100 ft.

LAND FORM GRADIENT: <5% (5-10%) 11-20% 21-30% >30%

LIMITING FACTORS: 1) Lack of pool development, 2) High scouring spring flows and low summer & fall flows. Low alkalinities and poor insect production.

ADDITIONAL OBSERVATIONS:

LAND MARKS: Bridge over stream. Road to Goat Creek.
INVESTIGATOR: B.May

* = Estimates

R-1 STREAM CHANNEL STABILITY FIELD EVALUATION FORM

Item Rated	Stability Indicators by Classes							
	EXCELLENT		GOOD		FAIR		POOR	
UPPER BANKS								
Landform Slope	Bank slope gradient <30%	(2)	Bank slope gradient 30-40%	(4)	Bank slope gradient 40-60%	(6)	Bank slope gradient 60% +	(8)
Mass Wasting (Existing or Potential)	No evidence of past or potential for future mass wasting into channels.	(3)	Infrequent and/or very small. Mostly healed over. Low future potential.	(6)	Moderate frequency & size, with some raw spots eroded by water during high flows.	(9)	Frequent or large, causing sediment nearly yearlong OR imminent danger of same.	(12)
Debris Jam Potential (Flowable Objects)	Essentially absent from immediate channel area.	(2)	Present but mostly small twigs and limbs.	(4)	Present, volume and size are both increasing.	(6)	Moderate to heavy amounts, predominantly larger sizes.	(8)
Bank Protection from Vegetation	90% + plant density. Vigor and variety suggests a deep, dense root mass.	(4)	70-90% density. Fewer plant species or lower vigor suggests a less dense or deep root mass.	(6)	50-70% density. Lower vigor and still fewer species form a somewhat shallow and discontinuous root mass.	(9)	< 50% density plus fewer species & less vigor indicate poor, discontinuous, and shallow root mass.	(12)
LOWER BANKS								
Channel Capacity	Ample for present plus some increases. Peak flows contained, W/D ratio <7.	(1)	Adequate. Overbank flows rare. Width to Depth (W/D) ratio 8-15.	(2)	Barely contains present peaks. Occasional overbank floods, W/D ratio 15-25.	(3)	Inadequate. Overbank flows common. W/D ratio >25.	(4)
Bank Rock Content	65% + with large, angular boulders 12" + numerous.	(2)	40 to 65%, mostly small boulders to cobble 6-12".	(4)	20 to 40% , with most in the 3-6" diameter class.	(6)	<20% rock fragments of gravel sizes, 1-3" or less.	(8)
Obstructions Flow Deflectors Sediment Traps	Rocks, old logs firmly embedded. Flow pattern of pool & riffles stable without cutting or deposition.	(2)	Some present, causing erosive cross currents and minor pool filling. Obstructions and deflectors newer and less firm.	(4)	Moderately frequent, moderately unstable obstructions & deflectors move with high water causing bank cutting and filling of pools.	(6)	Frequent obstructions and deflectors cause bank erosion yearlong. Sed. traps full, channel migration occurring.	(8)
Cutting	Little or none evident. Infrequent raw banks less than 6" high generally.	(4)	Some, intermittently at outcurves & constrictions. Raw banks may be up to 12".	(8)	Significant. Cuts 12"-24" high. Root mat overhangs and sloughing evident.	12)	Almost continuous cuts, some over 24" high. Failure of overhangs frequent.	(16)
Deposition	Little or no enlargement of channel or point bars.	(4)	Some new increas in bar formation, most from coarse gravels.	(8)	Moderate deposition of new gravel & coarse sand on old and some new bars.	(12)	Extensive deposits of predominately fine particles. Accelerated bar development.	(16)
BOTTOM								
Rock Angularity	Sharp edges and corners, plane surfaces roughened.	(1)	Rounded corners & edges, surfaces smooth & flat.	(2)	Corners & edges well rounded in two dimensions.	(3)	Well rounded in all dimensions, surfaces smooth.	(4)
Brightness	Surfaces dull, darkened, or stained. Gen, not "bright".	(1)	Mostly dull but may have up to 35% bright surfaces.	(2)	Mixture, 50-50% dull and bright, ± 15%, ie 35-65%.	(3)	Predominately bright, 65% + exposed or scoured surfaces.	(4)
Consolidation or Particle Packing	Assorted sizes tightly packed and/or overlapping.	(2)	Moderately packed with some overlapping.	(4)	Mostly a loose assortment with no apparent overlap.	(6)	No packing evident. Loose assortment, easily moved.	(8)
Bottom Size Distribution & Percent Stable Materials	No change in sizes evident. Stable materials 80-100%.	(4)	Distribution shift slight. Stable materials 50-80%.	(8)	Moderate change in sizes. Stable materials 20-50%.	(12)	Marked distribution change. Stable materials 0-20%.	(16)
Scouring and Deposition	Less than 5% of the bottom affected by scouring and deposition.	(6)	5-30% affected. Scour at constrictions and where grades steeper. Some deposition in pools.	(12)	30-50% affected. Deposits & scour at obstructions, constrictions, and bends. Some filling of pools.	(18)	More than 50% of the bottom in a state of flux or change nearly yearlong.	(24)
Clinging Aquatic Vegetation (Moss & Algae)	Abundant. Growth largely moss like, dark green, perennial, in swift water too.	(1)	Common. Algal forms in low velocity & pool areas. Moss here too and swifter waters.	(2)	Present but spotty, mostly in backwater areas. Seasonal blooms make rocks slick.	(3)	Perennial types scarce or absent. Yellow-green, short term blooms may be present.	(4)
	COLUMN TOTALS →	11		22		51		4

Add the values in each column for a total reach score here. (E. 11 + G. 22 + F. 51 + F. 4 = 88).

Reach score of: <38=Exellent, 39-76=Good, 77-114=Fair, >115=Poor.

Form R-1 2500-5 (6-73)

OVER

STREAM NUMBER & NAME: Sunday (Lower) STATIONS: DATE: 8/29/79

	WIDTH Present	WIDTH Full	DEPTH Present	DEPTH Full	VELOCITY	VOLUME
Pool	25	30	3.0'	5.0'	0.2 FS	20-25 CFS
Riffle	25	32	0.8'	2.5'	1 FS	20 CFS
Run						

TEMPERATURE Air: ____ Water: ____ GRADIENT 1%

STABILITY RATING 63 TURBIDITY: (Clear) Milky Muddy

% POOL (1, 2 and 3) 70 % RIFFLE 30 % RUN ____ % GLIDE ____

POOL CLASSES: % CLASS 1: 45 % CLASS 2: 19 % CLASS 3 27 % CLASS 4: 9

BOTTOM MATERIALS:	Very Abundant (> 70%)	Abundant (41 to 70%)	Common (11 to 40%)	Present (< 10%)	None 0
Organic Debris:		X			
Clay/Silt:		X			
Sand:		X			
Fine Gravel (0.1 to 1"):			X		
Coarse Gravel (1 to 3"):			X		
Small Rubble (3 to 6") :			X		
Large Rubble (6 to 12"):				X	
Boulders (>12"):				X	
Bed Rock:					X
AQUATIC VEGETATION:	X				

INSTREAM COVER: (Good) Fair Poor None

Cover Types (Indicate relative importance A > C > P): Logs A Rocks P Bottom Color tan (marl)

Undercut Banks C Water Color clear

Choppy Surface P Overhanging Vegetation A

BANK COVER: Good (Fair) Poor None

Major Plant Species: (Indicate relative importance: A > C > P)

Overstory Fir, larch, cedar, spruce

Understory Alder, dogwood, birch

Surface Sedges, thimbleberry, snowberry, birchberry

FISH FOOD ORGANISMS: >25/ft^2 (16-25/ft^2) 6-15/ft^2 1-5/ft^2

Food Types: Caddisflies C Mayflies: C Stoneflies: C Diptera P

(Indicate relative abundance A>C>P) Snails: ____ Leeches: ____

SIZE: S (M) L

SPAWNING HABITAT: Very Good Good Fair (Poor) None

	>50%	35-50%	20-34%	10-19%	<10%
% Gravel					
Velocity	Must be between 0.5 and 3 FPS				
Depth	Must be between 4 inches and 3 feet				

EMBEDDEDNESS D 1/3 2/3 (7/8) Full

VALLEY BOTTOM TYPE: (>300 ft.) 100-300 ft. <100 ft.

LAND FORM GRADIENT: (<5%) 5-10% 11-20% 21-30% >30%

LIMITING FACTORS:

ADDITIONAL OBSERVATIONS: Bottom coated with marl.

LAND MARKS: Bridge 3738 in 5.18' on either side

INVESTIGATOR: B. May

* = Estimates

R-1 STREAM CHANNEL STABILITY FIELD EVALUATION FORM

Item Rated	Stability Indicators by Classes							
	EXCELLENT		GOOD		FAIR		POOR	
UPPER BANKS								
Landform Slope	Bank slope gradient <30%	(2)	Bank slope gradient 30-40%	(4)	Bank slope gradient 40-60%	(6)	Bank slope gradient 60% +	(8)
Mass Wasting (Existing or Potential)	No evidence of past or potential for future mass wasting into channels.	(1)	Infrequent and/or very small. Mostly healed over. Low future potential.	(3)	Moderate frequency & size, with some raw spots eroded by water during high flows.	(5)	Frequent or large, causing sediment nearly yearlong OR imminent danger of same.	(12)
Debris Jam Potential (Flotable Objects)	Essentially absent from immediate channel area.	(1)	Present but mostly small twigs and limbs.	(3)	Present, volume and size are both increasing.	(5)	Moderate to heavy amounts, predominantly larger sizes.	(8)
Bank Protection from Vegetation	90% + plant density. Vigor and variety suggests a deep, dense root mass.	(1)	70-90% density. Fewer plant species or lower vigor suggests a less dense or deep root mass.	(3)	50-70% density. Lower vigor and still fewer species form a somewhat shallow and discontinuous root mass.	(5)	< 50% density plus few species & less vigor indicate poor, discontinuous, and shallow root mass.	(12)
LOWER BANKS								
Channel Capacity	Ample for present plus some increases. Peak flows contained, W/D ratio <7.	(1)	Adequate. Overbank flows rare. Width to Depth (W/D) ratio 8-15.	(2)	Barely contains present peaks. Occasional overbank floods. W/D ratio 15-25.	(3)	Inadequate. Overbank flows common. W/D ratio >25.	(4)
Bank Rock Content	65% + with large, angular boulders 12" + numerous.	(2)	40 to 65%, mostly small boulders to cobble 6-12".	(4)	20 to 40% , with most in the 3-6" diameter class.	(6)	<20% rock fragments of gravel sizes, 1-3" or less.	(8)
Obstructions Flow Deflectors Sediment Traps	Rocks, old logs firmly embedded. Flow pattern of pool & riffles stable without cutting or deposition.	(2)	Some present, causing erosive cross currents and minor pool filling. Obstructions and deflectors newer and less firm.	(4)	Moderately frequent, moderately unstable obstructions & deflectors move with high water causing bank cutting and filling of pools.	(6)	Frequent obstructions and deflectors cause bank erosion yearlong. Sed. traps full, channel migration occuring.	(8)
Cutting	Little or none evident. Infrequent raw banks less than 6" high generally.	(4)	Some, intermittently at outcurves & constrictions. Raw banks may be up to 12".	(8)	Significant. Cuts 12"-24" high. Root mat overhangs and sloughing evident.	(12)	Almost continuous cuts, some over 24" high. Failure of overhangs frequent.	(16)
Deposition	Little or no enlargement of channel or point bars.	(4)	Some new increas in bar formation, most from coarse gravels.	(8)	Moderate deposition of new gravel & coarse sand on old and some new bars.	(12)	Extensive deposits of predominately fine particles. Accelerated bar development.	(16)
BOTTOM								
Rock Angularity	Sharp edges and corners, plane surfaces roughened.	(1)	Rounded corners & edges, surfaces smooth & flat.	(2)	Corners & edges well rounded in two dimensions.	(3)	Well rounded in all dimensions, surfaces smooth.	(4)
Brightness	Surfaces dull, darkened, or stained. Gen. not "bright".	(1)	Mostly dull but may have up to 35% bright surfaces.	(2)	Mixture, 50-50% dull and bright, ± 15%, ie 35-65%.	(3)	Predominately bright, 65% +, exposed or scoured surfaces.	(4)
Consolidation or Particle Packing	Assorted sizes tightly packed and/or overlapping.	(2)	Moderately packed with some overlapping.	(4)	Mostly a loose assortment with no apparent overlap.	(6)	No packing evident. Loose assortment, easily moved.	(8)
Bottom Size Distribution & Percent Stable Materials	No change in sizes evident. Stable materials 80-100%.	(4)	Distribution shift slight. Stable materials 50-80%.	(8)	Moderate change in sizes. Stable materials 20-50%.	(12)	Marked distribution change. Stable materials 0-20%.	(16)
Scouring and Deposition	Less than 5% of the bottom affected by scouring and deposition.	(6)	5-30% affected. Scour at constrictions and where grades steeper. Some deposition in pools.	(12)	30-50% affected. Deposits & scour at obstructions, constrictions, and bends. Some filling of pools.	(18)	More than 50% of the bottom in a state of flux or change nearly yearlong.	(24)
Clinging Aquatic Vegetation (Moss & Algae)	Abundant. Growth largely moss like, dark green, perennial. In swift water too.	(1)	Common. Algal forms in low velocity & pool areas. Moss here too and swifter waters.	(2)	Present but spotty, mostly in quieter areas. Seasonal blooms make rocks slick.	(3)	Perennial types scarce or absent. Yellow-green, short term blooms may be present.	(4)
	COLUMN TOTALS →	23	→	10	→	30	→	

Add the values in each column for a total reach score here. (E. 23 + G. 10 + F. 30 + F. ___ = 63).

Reach score of: <38=Exellent, 39-76=Good, 77-114=Fair, 115=Poor.

Form R-1 2500-5 (6-73)

OVER

STREAM NUMBER & NAME: Sunday (Upper) STATIONS: DATE: 8/31/79

	WIDTH Present	WIDTH Full	DEPTH Present	DEPTH Full	VELOCITY	VOLUME
Pool	10	15	2.0	3.5	1 FS*	5-10 CFS*
Riffle	8	12	0.8	2.5	2 FS*	5-10 CFS*
Run						

TEMPERATURE Air: 65 GRADIENT 1.5%

Water: STABILITY RATING 70 TURBIDITY: (Clear) Milky Muddy

% POOL(1, 2 and 3) 20 % RIFFLE 80 % RUN % GLIDE

POOL CLASSES: % CLASS 1: % CLASS 2: 9 % CLASS 3 13 % CLASS 4: 78

BOTTOM MATERIALS:	Very Abundant (> 70%)	Abundant (41 to 70%)	Common (11 to 40%)	Present (< 10%)	None 0
Organic Debris:			20		
Clay/Silt:			20		
Sand:				10	
Fine Gravel (0.1 to 1"):				10	
Coarse Gravel (1 to 3"):			20		
Small Rubble (3 to 6") :			10		
Large Rubble (6 to 12"):			10		
Boulders (>12"):			10		
Bed Rock:					X
AQUATIC VEGETATION:		X			

INSTREAM COVER: (Good) Fair Poor None

Cover Types (Indicate relative importance A > C > P): Logs A Rocks C Bottom Color dark

Undercut Banks A Water Color -

Choppy Surface P Overhanging Vegetation A

BANK COVER: Good (Fair) Poor None

Major Plant Species: (Indicate relative importance: A > C > P)

Overstory Spruce,fir,larch,lodgepole

Understory Alder,mtn. maple,dogwood,gooseberry

Surface Grass forbs

FISH FOOD ORGANISMS: >25/ft^2 16-25/ft^2 6-15/ft^2 1-5/ft^2

Food Types: Caddisflies Mayflies: Stoneflies: Diptera

(Indicate relative abundance A>C>P) Snails: Leeches: SIZE: S M L

SPAWNING HABITAT: Very Good Good Fair (Poor) None

	>50%	35-50%	20-34%	10-19%	<10%
% Gravel					
Velocity	Must be between 0.5 and 3 FPS				
Depth	Must be between 4 inches and 3 feet				

EMBEDDEDNESS 0 (1/3) 2/3 Full

VALLEY BOTTOM TYPE: (>300 ft.) 100-300 ft. <100 ft.

LAND FORM GRADIENT: (<5%) 5-10% 11-20% 21-30% >30%

LIMITING FACTORS: 1) pool dev. in upper section, 2) silt in whole section.

ADDITIONAL OBSERVATIONS: Overmature spruce along bank, poor understory except for sides on streambank. Stream is quite silty. Upper section (500') has only class 4 pools, lower section has good pool dev.

LAND MARKS: Bridge on Rd. 315 in Sec. 6 500' on either side.

INVESTIGATOR: B. May

* = Estimates

R-1 STREAM CHANNEL STABILITY FIELD EVALUATION FORM

Item Rated	Stability Indicators by Classes							
	EXCELLENT		GOOD		FAIR		POOR	
UPPER BANKS								
Landform Slope	Bank slope gradient <30%.	(2)	Bank slope gradient 30-40%.	(4)	Bank slope gradient 40-60%.	(6)	Bank slope gradient 60% +	(8)
Mass Wasting (Existing or Potential)	No evidence of past or potential for future mass wasting into channels.	(3)	Infrequent and/or very small. Mostly healed over. Low future potential.	(6)	Moderate frequency & size, with some new spots eroded by water during high flows.	(9)	Frequent or large, causing sediment nearly yearlong OR imminent danger of same.	(12)
Debris Jam Potential (Floatable Objects)	Essentially absent from immediate channel area.	(2)	Present but mostly small twigs and limbs.	(4)	Present, volume and size are both increasing.	(6)	Moderate to heavy amounts, predominately larger sizes.	(8)
Bank Protection from Vegetation	90% + plant density. Vigor and variety suggests a deep, dense root mass.	(3)	70-90% density. Fewer plant species or lower vigor suggests a less dense or deep root mass.	(6)	50-70% density. Lower vigor and still fewer species form a somewhat shallow and discontinuous root mass.	(9)	<50% density plus fewer species & less vigor indicate poor, discontinuous, and shallow root mass.	(12)
LOWER BANKS								
Channel Capacity	Ample for present plus some increases. Peak flows contained, W/D ratio <7.	(1)	Adequate. Overbank flows rare. Width to Depth (W/D) ratio 8-15.	(2)	Barely contains present peaks. Occasional overbank floods. W/D ratio 15-25.	(3)	Inadequate. Overbank flows common. W/D ratio >25.	(4)
Bank Rock Content	65% + with large, angular boulders 12" + numerous.	(2)	40 to 65%, mostly small boulders to cobble 6-12".	(4)	20 to 40% , with most in the 3-6" diameter class.	(6)	<20% rock fragments of gravel sizes, 1-3" or less.	(8)
Obstructions Flow Deflectors Sediment Traps	Rocks, old logs firmly embedded. Flow pattern of pool & riffles stable without cutting or deposition.	(2)	Some present, causing erosive cross currents and minor pool filling. Obstructions and deflectors newer and less firm.	(4)	Moderately frequent, moderately unstable obstructions & deflectors move with high water causing bank cutting and filling of pools.	(6)	Frequent obstructions and deflectors cause bank erosion yearlong. Sed. traps full, channel migration occuring.	(8)
Cutting	Little or none evident. Infrequent raw banks less than 6" high generally.	(4)	Some, intermittently at outcurves & constrictions. Raw banks may be up to 12".	(8)	Significant. Cuts 12"-24" high. Root mat overhangs and sloughing evident.	(12)	Almost continuous cuts, some over 24" high. Failure of overhangs frequent.	(16)
Deposition	Little or no enlargement of channel or point bars.	(4)	Some new increas in bar formation, most from coarse gravels.	(8)	Moderate deposition of new gravel & coarse sand on old and some new bars.	(12)	Extensive deposits of predominately fine particles. Accelerated bar development.	(16)
BOTTOM								
Rock Angularity	Sharp edges and corners, plane surfaces roughened.	(1)	Rounded corners & edges, surfaces smooth & flat.	(2)	Corners & edges well rounded in two dimensions.	(3)	Well rounded in all dimensions, surfaces smooth.	(4)
Brightness	Surfaces dull, darkened, or stained. Gen. not "bright".	(1)	Mostly dull but may have up to 35% bright surfaces.	(2)	Mixture, 50-50% dull and bright, ± 15%, ie 35-65%.	(3)	Predominately bright, 65% + exposed or scoured surfaces.	(4)
Consolidation or Particle Packing	Assorted sizes tightly packed and/or overlapping.	(2)	Moderately packed with some overlapping.	(4)	Mostly a loose assortment with no apparent overlap.	(6)	No packing evident. Loose assortment, easily moved.	(8)
Bottom Size Distribution & Percent Stable Materials	No change in sizes evident. Stable materials 80-100%.	(4)	Distribution shift slight. Stable materials 50-80%.	(8)	Moderate change in sizes. Stable materials 20-50%.	(12)	Marked distribution change. Stable materials 0-20%.	(16)
Scouring and Deposition	Less than 5% of the bottom affected by scouring and deposition.	(6)	5-30% effected. Scour at constrictions and where grades steeper. Some deposition in pools.	(12)	30-50% affected. Deposits & scour at obstructions, constrictions, and bends. Some filling of pools.	(18)	More than 50% of the bottom in a state of flux or change nearly yearlong.	(24)
Clinging Aquatic Vegetation (Moss & Algae)	Abundant. Growth largely moss like, dark green, perennial, in swift water too.	(1)	Common. Algal forms in low velocity & pool areas. Moss here too and swifter waters.	(2)	Present but spotty, mostly in backwater areas. Seasonal blooms make slick.	(3)	Perennial types scarce or absent. Yellow-green, short term blooms may be present.	(4)
	COLUMN TOTALS →	6		45		19		

Add the values in each column for a total reach score here. (F. 6 + G. 45 + F. 19 + F. ___ = 70).

Reach score of: <38=Exellent, 39-76=Good, 77-114=Fair, ≥115=Poor.

Form R-1 2500-5 (6-73)

OVER

STREAM NUMBER & NAME: O'Brien Cr. (Lower) STATIONS: T59N R33W S32 DATE: 8/16/79

	WIDTH Present	WIDTH Full	DEPTH Present	DEPTH Full	VELOCITY	VOLUME
Pool						
Riffle						
Run						

TEMPFRATURE Air: 50° Water: 54° GRADIENT 1-2 % STABILITY RATING 75 TURBIDITY: (Clear) Milky Muddy

% POOL (1, 2 and 3) 25 % RIFFLE 35 % RUN 20 % GLIDE 20

POOL CLASSES: % CLASS 1: 4 % CLASS 2: 13 % CLASS 3 26 % CLASS 4&5 57

BOTTOM MATERIALS:	Very Abundant (> 70%)	Abundant (41 to 70%)	Common (11 to 40%)	Present (< 10%)	None 0
Organic Debris:				Trace	
Clay/Silt:				Trace	
Sand:				5	
Fine Gravel (0.1 to 1"):			20		
Coarse Gravel (1 to 3"):			20		
Small Rubble (3 to 6") :			30		
Large Rubble (6 to 12"):			20		
Boulders (>12"):				5	
Bed Rock:				X	
AQUATIC VEGETATION:					

INSTREAM COVER: (Good) Fair Poor None

Cover Types (Indicate relative importance A > C > P): Logs P Rocks A Undercut Banks P Choppy Surface C

Bottom Color mottled Water Color clear Overhanging Vegetation A

BANK COVER: (Good) Fair Poor None

Major Plant Species: (Indicate relative importance: A > C > P)
Overstory Alder,Bog Birch-A,P Pine,Fir,Spruce-P
Understory Dogwood,Alder,(A)Thimbleberry,Grasses(C)
Surface Dogwood, Alder-(A)

FISH FOOD ORGANISMS: >25/ft² 16-25/ft² 6-15/ft² 1-5/ft²
Food Types: Caddisflies A (>25) Mayflies: P(6-15) Stoneflies: P(1-5) Diptera -
(Indicate relative abundance A>C>P) Snails: — Leeches: —
SIZE: (S) M L

*SPAWNING HABITAT: Very Good Good (Fair) Poor None

% Gravel	>50%	35-50%	(20-34%)	10-19%	<10%
Velocity	Must be between 0.5 and 3 FPS				
Depth	Must be between 4 inches and 3 feet				

*EMBEDDEDNESS 0 (1/3) 2/3 Full

*VALLEY BOTTOM TYPE: X \ / _/

*LAND FORM GRADIENT: (<52) 5-10% 11-20% 21-30% >30% (>300 ft. 100-300 ft. <100 ft.)

*LIMITING FACTORS: Lack of suitable foods (although caddis are abundant, these are retreat building micro-caddis and not readily available to fish).

ADDITIONAL OBSERVATIONS: Braided channel near the upper end of the section. Two log jams in upper end of section, not barriers, bridge crossing for the O'Brien Creek Road. Slumping bank, approx 20' high, approx 250' below bridge.

1st-Large bending pool 500' above bridge.
LAND MARKS: Last-Run with gravel bar on right with alder overhanging 1/2 channel
INVESTIGATOR: width 500' below bridge. Deaver

* = Estimates

R-1 STREAM CHANNEL STABILITY FIELD EVALUATION FORM

Item Rated	Stability Indicators by Classes							
	EXCELLENT		GOOD		FAIR		POOR	
UPPER BANKS								
Landform Slope	Bank slope gradient <30%.	(2)	Bank slope gradient 30-40%.	(4)	Bank slope gradient 40-60%.	(6)	Bank slope gradient 60% +	(8)
Mass Wasting (Existing or Potential)	No evidence of past or potential for future mass wasting into channels.	(2)	Infrequent and/or very small. Mostly healed over. Low future potential.	(4)	Moderate frequency & size, with some raw spots eroded by water during high flows.	(6)	Frequent or large, causing sediment nearly yearlong OR imminent danger of same.	(8)
Debris Jam Potential (Floatable Objects)	Essentially absent from immediate channel area.	(2)	Present but mostly small twigs and limbs.	(4)	Present, volume and size are both increasing.	(6)	Moderate to heavy amounts, predominantly larger sizes.	(8)
Bank Protection from Vegetation	90% + plant density. Vigor and variety suggests a deep, dense root mass.	(3)	70-90% density. Fewer plant species or lower vigor suggests a less dense or deep root mass.	(6)	50-70% density. Lower vigor and still fewer species form a somewhat shallow and discontinuous root mass.	(9)	< 50% density plus fewer species & less vigor indicate poor, discontinuous, and shallow root mass.	(12)
LOWER BANKS								
Channel Capacity	Ample for present plus some increases. Peak flows contained, W/D ratio <7.	(1)	Adequate. Overbank flows rare. Width to Depth (W/D) ratio 8-15.	(2)	Barely contains present peaks. Occasional overbank floods. W/D ratio 15-25.	(3)	Inadequate. Overbank flows common. W/D ratio >25.	(4)
Bank Rock Content	65% + with large, angular boulders 12" + numerous.	(2)	40 to 65%, mostly small boulders to cobble 6-12".	(4)	20 to 40% , with most in the 3-6" diameter class.	(6)	< 20% rock fragments of gravel sizes, 1-3" or less.	(8)
Obstructions Flow Deflectors Sediment Traps	Rocks, old logs firmly embedded. Flow pattern of pool & riffles stable without cutting or deposition.	(3)	Some present, causing erosive cross currents and minor pool filling. Obstructions and deflectors newer and less firm.	(4)	Moderately frequent, moderately unstable obstructions & deflectors move with high water causing bank cutting and filling of pools.	(6)	Frequent obstructions and deflectors cause bank erosion yearlong. Sed. traps full, channel migration occuring.	(8)
Cutting	Little or none evident. Infrequent raw banks less than 6" high generally.	(2) (4)	Some, intermittently at outcurves & constrictions. Raw banks may be up to 12".	(8)	Significant. Cuts 12"-24" high. Root mat overhangs and sloughing evident.	(12)	Almost continuous cuts, some over 24" high. Failure of overhangs frequent.	(16)
Deposition	Little or no enlargement of channel or point bars.	(4)	Some new increase in bar formation, most from coarse gravels.	(7) (8)	Moderate deposition of new gravel & coarse sand on old and some new bars.	(12)	Extensive deposits of predominately fine particles. Accelerated bar development.	(16)
BOTTOM								
Rock Angularity	Sharp edges and corners, plane surfaces roughened.	(1)	Rounded corners & edges, surfaces smooth & flat.	(2)	Corners & edges well rounded in two dimensions.	(3)	Well rounded in all dimensions, surfaces smooth.	(4)
Brightness	Surfaces dull, darkened, or stained. Gen. not "bright".	(1)	Mostly dull but may have up to 35% bright surfaces.	(2)	Mixture, 50-50% dull and bright, ± 15%, ie 35-65%.	(3)	Predominately bright, 65% +, exposed or scoured surfaces.	(4)
Consolidation or Particle Packing	Assorted sizes tightly packed and/or overlapping.	(2)	Moderately packed with some overlapping.	(4)	Mostly a loose assortment with no apparent overlap.	(6)	No packing evident. Loose assortment, easily moved.	(8)
Bottom Size Distribution & Percent Stable Materials	No change in sizes evident. Stable materials 80-100%.	(4)	Distribution shift slight. Stable materials 50-80%.	(8) (10)	Moderate change in sizes. Stable materials 20-50%.	(12) (16)	Marked distribution change. Stable materials 0-20%.	(16)
Scouring and Deposition	Less than 5% of the bottom affected by scouring and deposition.	(6)	5-30% affected. Scour at constrictions and where grades steeper. Some deposition in pools.	(12) (14)	30-50% affected. Deposits & scour at obstructions, constrictions, and bends. Some filling of pools.	(18)	More than 50% of the bottom in a state of flux or change nearly yearlong.	(24)
Clinging Aquatic Vegetation (Mors & Algae)	Abundant. Growth largely moss like, dark green, perennial. In swift water too.	(1)	Common. Algal forms in low velocity & pool areas. Moss here too and swifter waters.	(3) (6)	Present but spotty, mostly in backwater areas. Seasonal blooms make rocks slick.	(9)	Perennial types scarce or absent. Yellow-green, short term bloom may be present.	(12)
	COLUMN TOTALS —	16		59				

Add the values in each column for a total reach score here. (E. 16 + G. 59 + F. ___ + F. ___ = 75).

Reach score of: 38=Exellent, 39-76=Good, 77-114=Fair, 115=Poor.

Form R-1 2500-5 (6-73)

OVER

STREAM NUMBER & NAME: Q'Brien Cr. (Upper) STATIONS: T6ONR33W S.7 DATE: 8/16/79

	WIDTH Present	WIDTH Full	DEPTH Present	DEPTH Full	VELOCITY	VOLUME
Pool						
Riffle						
Run						

Air: 64° GRADIENT 3%

TEMPERATURE Water: 48° STABILITY RATING 70 TURBIDITY: (Clear) Milky Muddy

% POOL (1, 2 and 3) 22 % RIFFLE 40 % RUN 28 % GLIDE 10

POOL CLASSES: % CLASS 1: 0 % CLASS 2: 8 % CLASS 3 21 % CLASS 4: 71

BOTTOM MATERIALS:	Very Abundant (> 70%)	Abundant (41 to 70%)	Common (11 to 40%)	Present (< 10%)	None 0
Organic Debris:				Trace	
Clay/Silt:				Trace	
Sand:				Trace	
Fine Gravel (0.1 to 1"):				5	
Coarse Gravel (1 to 3"):				10	
Small Rubble (3 to 6") :			10		
Large Rubble (6 to 12"):			30		
Boulders (>12"):			30		
Bed Rock:			15		
AQUATIC VEGETATION:				X	

INSTREAM COVER: Good (Fair) Poor None

Cover Types (Indicate relative importance A > C > P)
Logs P Rocks A Bottom Color mottled
Undercut Banks P Water Color clear
Choppy Surface C Overhanging Vegetation A

BANK COVER: (Good) Fair Poor None

Major Plant Species: (Indicate relative importance: A > C > P)
Overstory Alder, Bog Birch, Dogwood-A, Spruce-P
Understory Alder, Dogwood, Willow-A, Thimbleberry, Rose, Raspberry
Surface Alder, Dogwood-A, Willow-C

FISH FOOD ORGANISMS: >25/ft² 16-25/ft² 6-15/ft² 1-5/ft²
Food Types: Caddisflies C16-25 Mayflies: C16-25 Stoneflies: - Diptera -
(Indicate relative abundance A>C>P) Snails: - Leeches: -
SIZE: (S) M L

*SPAWNING HABITAT: Very Good Good Fair (Poor) None

	>50%	35-50%	20-34%	10-19%	<10%
% Gravel					
Velocity	Must be between 0.5 and 3 FPS				
Depth	Must be between 4 inches and 3 feet				

*EMBEDDEDNESS 0 (1/3) 2/3 Full

*VALLEY BOTTOM TYPE: (>300 ft.) \ 100-300 ft. / <100 ft.

*LAND FORM GRADIENT: (<5%) 5-10% 11-20% 21-30% >30%

*LIMITING FACTORS: None

ADDITIONAL OBSERVATIONS: In the upper 500' there is approx 60' of cascading riffle. Backwater from Beaver Dam begins to have effect just at lower end of this section.
Fish Present - WCT, BT, DV

LAND MARKS: 1st - large western red cedar on right 500' above crossing. last - beginning of backwater from beaver dam 500' below
INVESTIGATOR: Deaver

* = Estimates

R-1 STREAM CHANNEL STABILITY FIELD EVALUATION FORM

Item Rated	Stability Indicators by Classes							
	EXCELLENT		GOOD		FAIR		POOR	
UPPER BANKS								
Landform Slope	No evidence of past or potential for future mass wasting into channels.	(2) (4)	Infrequent and/or very small. Mostly healed over. Low future potential.	(4) (6)	Moderate frequency & size, with some raw spots eroded by water during high flows.	(6) (9)	Frequent or large, causing sediment nearly yearlong OR imminent danger of same.	(8) (12)
Mass Wasting (Existing or Potential)								
Debris Jam Potential (Flootable Objects)	Essentially absent from immediate channel area.	(2) (4)	Present but mostly small twigs and limbs.	(4)	Present, volume and size are both increasing.	(6)	Moderate to heavy amounts, predominantly larger sizes.	(8)
Bank Protection from Vegetation	90% + plant density. Vigor and variety suggests a deep, dense root mass.	(3) (6)	70-90% density. Fewer plant species or lower vigor suggests a less dense or deep root mass.	(6)	50-70% density. Lower vigor and still fewer species form a somewhat shallow and discontinuous root mass.	(9)	< 50% density plus fewer species & less vigor indicate poor, discontinuous, and shallow root mass.	(12)
LOWER BANKS								
Channel Capacity	Ample for present plus some increases. Peak flows contained, W/D ratio <7.	(1)	Adequate. Overbank flows rare. Width to Depth (W/D) ratio 8-15.	(2)	Barely contains present peaks. Occasional overbank floods. W/D ratio 15-25.	(3)	Inadequate. Overbank flows common. W/D ratio >25.	(4)
Bank Rock Content	65% + with large, angular boulders 12" + numerous.	(2)	40 to 65%, mostly small boulders to cobble 6-12".	(4)	20 to 40% , with most in the 3-6" diameter class.	(6)	< 20% rock fragments of gravel sizes, 1-2" or less.	(8)
Obstructions Flow Deflectors Sediment Traps	Rocks, old logs firmly embedded. Flow pattern of pool & riffles stable without cutting or deposition.	(2)	Some present, causing erosive cross currents and minor pool filling. Obstructions and deflectors newer and less firm.	(4)	Moderately frequent, moderately unstable obstructions & deflectors move with high water causing bank cutting and filling of pools.	(6)	Frequent obstructions and deflectors cause bank erosion yearlong. Sed. traps full, channel migration occuring.	(8)
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Deposition	Little or no enlargement of channel or point bars.	(4)	Some new increas in bar formation, most from coarse gravels.	(8)	Moderate deposition of new gravel & coarse sand on old and some new bars.	(12)	Extensive deposits of predominately fine particles. Accelerated bar development.	(16)
BOTTOM								
Rock Angularity	Sharp edges and corners, plane surfaces roughened.	(1)	Rounded corners & edges, surfaces smooth & flat.	(2)	Corners & edges well rounded in two dimensions.	(3)	Well rounded in all dimensions, surfaces smooth.	(4)
Brightness	Surfaces dull, darkened, or stained. Gen. not "bright".	(1)	Mostly dull but may have up to 35% bright surfaces.	(2)	Mixture, 50-50% dull and bright, ± 15%. ie 35-65%.	(3)	Predominately bright, 65% + exposed or scoured surfaces.	(4)
Consolidation or Particle Packing	Assorted sizes tightly packed and/or overlapping.	(2)	Moderately packed with some overlapping.	(4)	Mostly a loose assortment with no apparent overlap.	(6)	No packing evident. Loose assortment, easily moved.	(8)
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Scouring and Deposition	Less than 5% of the bottom affected by scouring and deposition.	(6)	5-30% affected. Scour at constrictions and where grades steeper. Some deposition in pools.	(12)	30-50% affected. Deposits & scour at obstructions, constrictions, and bends. Some filling of pools.	(18)	More than 50% of the bottom in a state of flux or change nearly yearlong.	(24)
Clinging Aquatic Vegetation (Moss & Algae)	Abundant. Growth largely moss like, dark green, perennial, in swift water too.	(1)	Common. Algal forms in low velocity & pool areas. Moss here too and swifter waters.	(2)	Present but spotty, mostly in backwater areas. Seasonal blooms make rocks slick.	(3)	Perennial types scarce or absent. Yellow-green, short term blooms may be present.	(4)
COLUMN TOTALS	26		38		6			

Add the values in each column for a total reach score here. (E. 26 + G. 38 + F. 6 + F. ___ = 70).

Reach score of: 38=Exellent, 39-76=Good, 77-114=Fair, 115+=Poor.

Form R-1 2500-5 (6-73)

OVER